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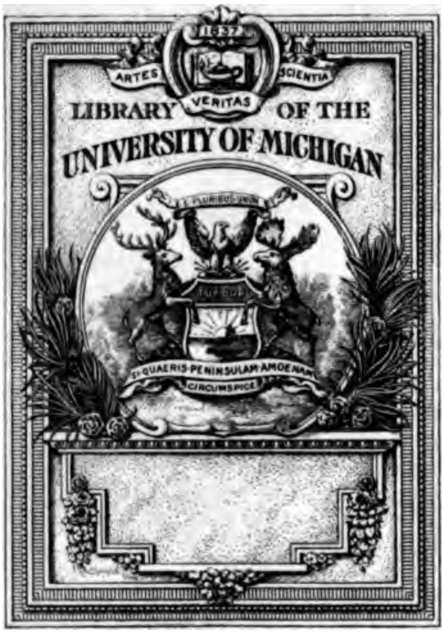
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38TH CONGRESS, 1st Session. } HOUSE OF REPRESENTATIVES. { Ex. Doc. No. 1.

MESSAGE

OF THE

PRESIDENT OF THE UNITED STATES,

AND

ACCOMPANYING DOCUMENTS,

TO THE

TWO HOUSES OF CONGRESS,

AT

THE COMMENCEMENT OF THE FIRST SESSION

OF

THE THIRTY-EIGHTH CONGRESS.

WASHINGTON:
GOVERNMENT PRINTING OFFICE
1863.

REPORT

OF

THE SECRETARY OF WAR.

WAR DEPARTMENT,
Washington City, December 5, 1863.

MR. PRESIDENT: A general summary of the military operations of the past year is furnished by the report of the general-in-chief, herewith submitted. A list of the detailed official reports that have been returned to this department by the generals commanding also accompanies this report. The influence of these operations, in suppressing the rebellion and restoring the authority of the general government, cannot be overestimated. The victories of Stone river and of Gettysburg, the operations before Vicksburg and Port Hudson, the occupation of East Tennessee, the battle of Chickamauga, and the recent splendid successes before Chattanooga, and other engagements of less note, are events that evince skill, courage, and loyal patriotism, and a brilliancy of military achievement by the forces of the United States unsurpassed in any age; while the less fortunate battles of Fredericksburg and Chancellorsville manifested the spirit and fortitude of our troops in a degree worthy of the highest admiration.

By the reduction of Vicksburg and Port Hudson, the navigation of the Mississippi river has been opened, and the national commerce is rapidly and securely returning to that great highway of the continent. The rebel territory has been cut in twain; the States west of the Mississippi no longer furnish their ample supplies to the rebels, while the people of those States are showing such signs of returning loyalty that a speedy restoration of civil government may confidently be anticipated.

In this view, the reduction of strongholds, the capture of prisoners by thousands, and the acquisition of immense stores of munitions of war, are not more important than the political consequences of these great military achievements. The occupation of East Tennessee by the forces under General Burnside, and the operations resulting in the occupation of Chattanooga, and the defeat of Bragg's army by the forces under General Grant, not only shed lustre upon our arms, but, by affording protection to a loyal population, they cannot fail greatly to weaken the rebel strength, and operate strongly in restoring the authority of the federal government.

The combined operations against Charleston have not yet accomplished all that was expected from them, but the seizure and occupation of Morris island by the forces under command of General Gillmore, the reduction of Forts Wagner and Sumter, are exploits in which the skill and gallantry of the officers, and the valor of our troops have been exhibited in a degree of which the country is justly proud.

In the State of Texas the flag of the Union has, during the whole war, been upheld by a small force at Franklin, so that the rebels have never succeeded in wholly excluding federal authority from that State. The large force under General Banks now operating in Texas will afford protection to the loyal population, who have long been anxiously looking for sufficient military power to enable them to re-establish civil government. That period appears now at hand. By the occupation of that State the chief avenue of the rebels for foreign commerce and foreign aid is cut off.

In the east the position of military affairs has not undergone material change. In June the long-cherished design of the rebel leaders to transfer the seat of war from their own territory to the loyal States was undertaken by their favorite commander and their principal army. But the defeat of General Lee, by the forces under command of General Meade, at Gettysburg, destroyed their expectations, and drove back the enemy to his accustomed shelter in the mountains of Virginia. The armies of General Meade and General Lee now occupy, relatively, nearly the same position as at the date of my last annual report. The numerous combats and engagements between detachments of these armies have been attended with perhaps equal loss on both sides, and without any material advantage to either.

Western Virginia is reported by the commander of that department to be now clear of any rebel force, and the people of that newly organized State are enjoying, in comparative peace, the blessing of civil government.

The military operations in the northwest department have routed, and, in a great measure, destroyed, the hostile Indians, and afford protection to the people in that region from Indian barbarities. In the department of Missouri the rebel forces have been driven beyond the Arkansas line.

No military operations of any magnitude have taken place in the departments of Virginia and North Carolina. A threatened siege of Norfolk and Suffolk, by the rebel General Longstreet, was thwarted by the vigilant energy of General Dix, and a siege of Washington, in North Carolina, by the rebel General Hill, proved abortive.

The federal force is now firmly planted in every rebel State; and there is reason to hope that under its protection the loyal people of those States will soon cast off the yoke of their leaders, and seek within the Union that peace and security for life, liberty, and property which, in blind madness, were recklessly thrown away.

The success of our arms during the last year has enabled the department to make a reduction of over two hundred millions of dollars in the war estimates for the ensuing fiscal year.

In the operations that have been alluded to, prisoners of war to the number of about thirteen thousand have fallen into the hands of the enemy, and are now held by them. From the commencement of the rebellion, until the War Department came into my charge, there was no cartel or formal exchange of prisoners; but at an early period afterwards a just and reasonable cartel was made between Major General Dix and the rebel General Hill, which, until recently, was faithfully acted upon by both parties. Exchanges under that cartel are now stopped, mainly for the following reasons:

First. At Vicksburg over thirty thousand rebel prisoners fell into our hands, and over five thousand more at Port Hudson. These prisoners were paroled and suffered to return to their homes, until exchanged pursuant to the terms of the cartel. But the rebel agent, in violation of the cartel, declared the Vicksburg prisoners exchanged; and, without being exchanged, the Port Hudson prisoners he, without just cause, and in open violation of the cartel, declared released from their parole. These prisoners were returned to their ranks, and a portion of them were found fighting at Chattanooga, and again captured. For this breach of faith, unexampled in civilized warfare, the only apology or excuse was, that an equal number of prisoners had been captured by the enemy. But, on calling for specifications in regard to these alleged prisoners, it was found that a considerable number represented as prisoners were not soldiers, but were non-combatants—citizens of towns and villages, farmers, travellers, and others in civil life, not captured in battle, but taken at their homes, on their farms, or on the highway, by John Morgan and other rebel raiders, who put them under a sham parole. To balance these men against rebel soldiers taken on the field would be relieving the enemy from the pressure of war, and enable him to protract the contest to indefinite duration.

Second. When the government commenced organizing colored troops, the rebel leader, Davis, by solemn and official proclamation, announced that the colored troops and their white officers, if captured, would not be recognized as prisoners of war, but would be given up for punishment by the State authorities.

These proceedings of the rebel authorities were met by the earnest remonstrance and protest of this government, without effect. The offers, by our commissioner, to exchange man for man, and officer for officer, or to receive and provide for our own soldiers, under the solemn guarantee that they should not go into the field until duly exchanged, were rejected. In the mean time, well-authenticated statements show that our troops held as prisoners of war were deprived of shelter, clothing, and food, and some have perished from exposure and famine. This savage barbarity could only have been practiced in the hope that this government would be compelled, by sympathy for the suffering endured by our troops, to yield to the proposition of exchanging *all* the prisoners of war on both sides, paroling the excess not actually exchanged; the effect of which operation would be to enable the rebels to put into the field a new army forty thousand strong, forcing the paroled prisoners into the ranks without exchange, as was done with those paroled at Vicksburg and Port Hudson, and also to leave in the hands of the rebels the colored soldiers and officers, who are not regarded by them as prisoners of war, and therefore not entitled to the benefit of the proposed exchange.

The facts and correspondence relating to this subject are detailed in the accompanying report of Major General Hitchcock, commissioner of exchanges. As the matter now stands, we have over forty thousand prisoners of war, ready at any moment to be exchanged, man for man and officer for officer, to the number held by the rebels. These number about thirteen thousand, who are now supplied with food and raiment by this government, and by our benevolent and charitable associations and individuals. Two prisoners, Captains Sawyer and Flynn, held by the rebels, are sentenced to death, by way of a pretended retaliation for two prisoners tried and shot as spies by command of Major General Burnside. Two rebel officers have been designated, and are held as hostages for them.

The rebel prisoners of war in our possession have heretofore been treated with the utmost humanity and tenderness consistent with security. They have had good quarters, full rations, clothing when needed, and the same hospital treatment received by our own soldiers. Indulgence of friendly visits and supplies was formerly permitted, but they have been cut off since the barbarity practiced against our prisoners became known to the government. If it should become necessary for the protection of our men, strict retaliation will be resorted to. But while the rebel authorities suffer this government to feed and clothe our troops held as prisoners, we shall be content to continue to their prisoners in our hands the humane treatment they have uniformly enjoyed.

The operation of the act of Congress for enrolling and calling out the national forces is exhibited in the accompanying report of the provost marshal general. At the time that law was enacted it was known to be very imperfect, many intelligent persons considering its execution wholly impracticable, while few dared to hope for any important benefit. The law has been enforced in twelve States. It has brought from these States fifty thousand soldiers, and has raised a fund of over ten millions for procuring substitutes. With all its imperfections it is demonstrated that the act can be made an efficient means for recruiting our armies and calling out the national forces. The principal imperfections and the required amendments will be submitted to Congress through the appropriate committees. The most important to be considered is what is called the three hundred dollar commutation. This feature of the act has been much discussed, and opposing opinions are nearly balanced as to the operation and effect of this provision. While some claim that it is oppressive upon poor men and favors the rich, others contend that it places rich and poor on an equal footing, and enables the poor man to obtain exemption from military duty for a sum within the reach of every one. Without undertaking to reconcile or decide between these conflicting opinions, it is certain that this clause of exemption, as it stands, occasions delay in calling out the military force. The drafted man is exempted, at the end of a long proceeding, by the payment of a sum of money. Supposing that sum to be adequate for procuring a substitute, considerable time unavoidably elapses before a competent substitute can be procured. The question whether this clause shall remain or be stricken out requires the early attention of Congress. The fund of ten millions raised by the act as commutation money, is deposited with the United States assistant treasurers, and is being applied to procuring substitutes by the payment of bounties and premiums.

Volunteering is going on, in some States, with much spirit. The prime importance of filling up the old regiments, and the superiority of such force over new regiments, is a point on which all military experience and opinions agree. The bounty paid by the government is, therefore, limited to volunteers who go into old regiments, or to veteran regiments that renew their term of service. To veteran volunteers going into old regiments the maximum bounty of the government is paid. Reports from the armies indicate that a large proportion of the troops whose term expires next year will re-enlist—it being stipulated by the government that they shall have at least one month's furlough before their present term expires. The indications are that the force required will, in a great measure, be raised by volunteering without draft. It is proper to add that commanding generals bear testimony that the drafted men who have gone into the ranks acquit themselves well, and make good soldiers. An immediate appropriation for bounties should be made.

An invalid corps has been organized under the direction of the provost marshal general. In the sanguinary battles and engagements of this war, and by camp diseases, many officers and soldiers have been disabled for active service who are yet able to perform duty in garrison, or as depot and prison guards, military police, and in the arrest of skulkers and deserters. To give honorable employment to this meritorious class, who have suffered in the service of their country, and to liberate able-bodied soldiers from duty that can well be performed by the invalids, was the purpose in organizing this corps. It now numbers over twenty thousand officers and privates, who are fully employed; and their service has increased the strength of the armies in the field, while by their vigilance desertion from the army has in a great measure been checked. The beneficial results anticipated from this organization have been more than realized. For the details in respect to this organization reference is made to the report of the provost marshal general, which is also referred to for details in respect to the operation of the act enrolling and calling out the national forces, and the required amendments.

Immediately after the President's emancipation proclamation diligent efforts were commenced, and have continued until the present time, for raising colored troops. The adjutant general was sent to the Mississippi valley to organize the system there. A bureau, to have in charge all matters belonging to such troops, was organized in the War Department. The report of its chief shows what progress has been made.

Over fifty thousand men are now organized and in the ranks, and the number will rapidly increase as our armies advance into the rebel States. The raising of these troops has been retarded, first, by the military operations in progress; and, second, by the removal of the slaves into the interior beyond reach of our recruiting agents. This obstacle, it is hoped, will soon be entirely overcome.

Many persons believed, or pretended to believe, and confidently asserted, that freed slaves would not make good soldiers; that they would lack courage, and could not be subjected to military discipline. Facts have shown how groundless were these apprehensions. The slave has proved his manhood, and his capacity as an infantry soldier, at Milliken's Bend, at the assault upon Port Hudson, and the storming of Fort Wagner. The apt qualifications of the colored man for artillery service have long been known and recognized by the naval service, and the subjoined extract from an official report shows what he can do in cavalry service:

"On the 17th instant, thirty men of company A, 1st Mississippi cavalry, (African,) in connexion with fifty men of the 1st battalion 4th Illinois cavalry, while on a scout up the Yazoo valley, met, one mile beyond Sartasia, one hundred and fifty picked men of the 1st and 3d Texas cavalry. The 1st Mississippi behaved nobly, neither lacking courage or steadiness, firing with coolness and precision. The engagement lasted half an hour, the Texans being totally routed and demoralized, we capturing twenty-eight stands of arms and seven prisoners."

The colored troops have been allowed no bounty, and, under the construction given by the department, they can only, by existing law, receive the pay of ten dollars per month, white soldiers being paid thirteen dollars per month, with clothing and a daily ration. There seem to be inequality and injustice in this distinction, and an amendment, authorizing the same pay and bounty as white troops receive, is recommended. Soldiers of the Union, fighting under its banner, and exposing their lives in battle to uphold the government, colored troops are entitled to enjoy its justice and beneficence.

The fortunes of war have brought within our lines a large number of colored women, children, and some aged and infirm persons. Their care, support, and protection rest a solemn trust upon the government. Their necessities have to some extent been supplied by the order of this department, but a general and permanent system for their protection and support should be speedily adopted by Congress. Even if they are to be regarded as in some degree a burden upon the government, they are a greater loss to the enemy. Every woman and child, from nine years old to sixty, has to the rebel planter a high market value. Their labor in the cotton field is a source of profit to him. Is it not better that we should feed them than that they should support the rebel master who is in arms against us?

The reports of the several chiefs of bureaus in this department exhibit fully their respective operations during the last year.

The adjutant general reports that the business of his office has greatly increased during the past year by the creation of the provost marshal general's bureau and the bureau for the organization of colored troops. He recommends:

First. That the term of enlistment in the regular service be fixed at three years, instead of five, in accordance with the act of July 29, 1861, which expired by limitation on the 1st of January, 1863.

Second. That the law regulating the payment of chaplains be amended so as to allow half pay and rations during absence on leave occasioned by other cause than wounds or sickness, and to full pay without rations when absent for those causes.

A serious evil arising from the absence of officers from duty has, in the past year, been in great part remedied. Two boards are in session, one at Annapolis, the other at Cincinnati, before one of which all officers who have left their commands in consequence of ill health are ordered to appear as soon as they are able to travel. They undergo an examination by the board, and are recommended, according to their condition, for light duty, for further leave of absence, or for medical treatment in a general hospital of the city where the board is in session. But if found fit for duty, the president of the board orders them forthwith to their regiments. The reports of the boards are a guide to the adjutant general in making details for mustering, recruiting, or other light duty, and in recommendations for leave of absence or discharge, where the nature of the disability requires. The reports of the boards, taken in connexion with regimental reports of absent officers and the surgeons' certificates from such officers, form a complete system of accountability for absence from duty.

The specific duty of the Ordnance department is to supply arms and munitions of war for sea-coast and frontier fortifications, and for the forces in the field.

The expenditures for these purposes during the last fiscal year amount to $42,313,630 21.

The cannon, small arms, accoutrements, and equipments for men and horses, and ammunition obtained during the last fiscal year, by purchase and manufacture, were as follows:

1,577	field, siege, and sea-coast cannon, with carriages, caissons, and other implements.
1,082,841	muskets and rifles for foot-soldiers.
282,389	carbines and pistols for mounted troops.
1,251,995	cannon balls and shells.
48,719,862	pounds of lead and lead bullets.
1,435,046	cartridges for artillery.
259,022,216	cartridges for small arms.
347,276,400	percussion caps.
3,925,369	friction primers.

5,764,768 pounds of gunpowder.
919,676 sets of accoutrements for men.
94,639 sets of equipments for cavalry horses.
3,281 sets of artillery harness, each set for two horses.

An immense amount of material has been prepared at the different arsenals, and work in metals, wood, and leather, in large quantity, is advanced towards completion, for the manufacture and repairs of all the various machines and implements of war in use in the service.

The quantities of the principal articles of ordnance materials in the control of the department at the beginning of the war, the quantities of those articles that have since been procured, and the quantities of those articles on hand on June 30, 1863, are shown in the following table, viz:

Names of articles.	On hand at beginning of war.	Procured since war began.	Issued since war began.	On hand for issue June 30, 1863.
Siege and sea-coast artillery	1,052	1,064	2,088	928
Field artillery	231	2,734	2,481	484
Fire-arms for infantry	437,433	1,950,144	1,551,576	836,001
Fire-arms for cavalry	31,268	338,128	327,170	42,226
Sabres	16,933	337,555	271,817	82,671
Cannon balls and shells	363,591	2,562,744	1,745,586	1,180,749
Lead and lead bullets, in pounds	1,301,766	71,776,774	50,054,515	23,024,025
Cartridges for artillery	28,248	2,738,746	2,274,490	492,504
Cartridges for small arms	8,292,300	522,204,816	378,584,104	151,913,012
Percussion caps	19,808,000	769,475,000	715,036,470	74,246,530
Friction primers	83,425	7,004,709	6,082,505	1,005,629
Gunpowder, in pounds	1,110,584	13,424,363	13,071,073	1,463,874
Saltpetre, in pounds	2,923,348	5,231,731	None.	8,155,079
Accoutrements for infantry	10,930	1,831,300	1,680,220	162,010
Accoutrements for cavalry	4,320	194,466	196,298	2,498
Equipments for cavalry horses	574	216,658	211,670	5,562
Artillery harness, (double)	586	18,666	17,485	1,767

The resources of this country for the production of arms and munitions of war have only commenced their development, yet their extent may be inferred from the enormous quantity of supplies shown by the foregoing tabular abstract to have been furnished during the last two years. At the beginning of the war we were compelled to rely upon foreign countries for the supply of nearly all our arms and munitions. Now all these things are manufactured at home, and we are independent of foreign countries not only for the manufactures, but also for the materials of which they are composed.

The excellence of arms and munitions of American manufacture which have been supplied by the ordnance department to the army, has been so obvious that our soldiers are no longer willing to use those which have been imported from other countries.

The efforts made during the war to extend and improve the manufacture of arms and munitions have resulted in discoveries of great importance to the country in peace as well as in war. Among the arts thus improved is the manufacture of wrought iron, now rivalling the finest qualities of the iron of Sweden, Norway, and England, so highly prized in the arts.

This country, until the present year, has relied upon those countries for material to make gun-barrels, bridle-bits, car-wheel tires, and other articles requiring iron of finest quality. The iron of our own production is now superior to that obtained abroad for all these purposes.

The law of 1808 made provision for the annual expenditure of $200,000 for arming the militia of the States. That sum is insufficient for the wants of the increased population of the country. Two millions of dollars should be annually appropriated for that purpose, until all the States are supplied, in proportion to their population, with the same number of arms that have been distributed in some of the States to meet the exigencies of the war.

From the report of the chief of engineers, it appears that the grants made by Congress for fortifications, at its last session, amounted to $5,250,000 for permanent works, and $700,000 for temporary works. These liberal provisions allowed of very material progress being made upon the important class of fortifications now under construction, and of essential modifications being effected in old works and existing batteries, to obtain largely increased efficiency, by preparing them to receive ordnance of greatly increased calibres, and to store greater bulks of ammunition, with additional security afforded therefor.

These important objects have been very generally realized. The difficulties existing last year in the procurement and transportation of materials, and in obtaining the requisite amount of skilled and ordinary labor, have increased; but these difficulties have been surmounted or avoided to such a degree that the general result is very favorable, and our seaboard and border fortifications are now in condition to afford a formidable defence, decidedly stronger than last year.

The report of the annual board of visitors of the Military Academy is herewith submitted. There being no representation from the rebel States in the academy since the war commenced, there existed accommodation for a considerable number of cadets beyond those furnished from the loyal States. There seemed to be no good reason why the advantages of the academy should not be enjoyed to the fullest capacity, and accordingly the vacancies were this session filled up by appointments from loyal States, the generals commanding armies being invited to furnish the names of deserving young men from their respective commands; and in this way the number of cadets allowed by law have been admitted to the advantages of military education in the academy at West Point. The usual statement, showing the condition in life of the cadets for a number of years past, and a list of the present officers and cadets of the academy, accompany the report of the chief engineer.

The operations connected with the survey of the northern and northwestern lakes have been actively continued, and during the past season have consisted in a survey of Portage entry, on Lake Superior, and in resuming the survey of Green bay and its entrance from Lake Michigan; also of the periodical examination of the channels of the St. Clair flats, and of Lake George of St. Mary's river. Observations for the determination of geographical positions, of the fluctuations of the elevation of the surfaces of the lakes, and of the meteorological phenomena are embraced in the operations of the survey. The number of lake charts distributed to navigators to the first of October, 1863, exceeds 24,000, of which over 4,000 were distributed the past year.

By the direction of this department, an experienced and skilful officer has been detailed to examine and report what temporary works are required to guard the lake shores from rebel and piratical raids.

The department charged with the disbursement of the funds for surveys for military defences has, in addition to its current duties, prepared for military purposes (to which their distribution is necessarily restricted) an aggregate of 8,841 maps, of which 6,927 were engraved and lithographed, and 1,914 were photographed.

The clothing and equipment of troops, their shelter and transportation; the purchase of wagons, horses and mules; the supply of forage; the construction, repair, and working of military roads; and the supply of boats for transportation by water, constitute important duties of the quartermaster general's department. The detail of these operations, so far as is proper for public information, is contained in the acting quartermaster general's report, and need not here be recapitulated. The adequate supply of mules and horses, and their subsistence, are among the most arduous duties of the service. To systematize this branch of service, with adequate supervision and proper economy, so far as practicable, a cavalry bureau was established a few months ago, and is now in operation at Gieseboro. It is believed that by this means much improvement may be made, with proper diligence and fidelity on the part of the officers intrusted with this important duty.

The quartermaster general has for some months been making a careful personal inspection of his branch of service in the different military departments, but his report has not yet been received.

The report of the commissary general of subsistence shows that the subsistence for the army, with the exception of fresh beef and flour, has in great part been procured by advertising for bids, and selecting the lowest for suitable articles, in the cities of Boston, New York, Philadelphia, Baltimore, Cincinnati, Louisville, and St. Louis. Flour has, when possible, been procured in the same manner at points nearer to our armies. Fresh beef has been obtained in general by contract, sometimes on the hoof, and at other times from the block. On the coast of the Carolinas and the Gulf, and for a large portion of the year at New Orleans, beef has been forwarded on the hoof from New York. It is believed that at every point the troops have been supplied with abundance of good wholesome food, and that if, in movements of our armies, a temporary want has been felt, it has not been due to any cause over which the officers of this department had control. In addition to the troops, subsistence has been furnished to all prisoners, whether political or war, to large numbers of contrabands, and to suffering Union families found by our armies in the rebel States. Great improvement has taken place in the rendering of accounts by volunteer officers, although cases of neglect still exist. The few regular officers of this branch of the service have had heavy labors and responsibilities imposed upon them, and have exhibited intelligence, integrity, and zeal.

The paymaster general reports that, except where payments have been postponed by commanding generals, on account of pending operations, the various armies in the field are substantially paid to the 31st of October, 1863, the latest period allowable by law and regulation, and that funds have been provided and placed in the proper hands for full payment of all the troops in service up to the date mentioned.

By the report of the acting surgeon general, the department is informed that the latest reports received give one hundred and eighty-two general hospitals, with a capacity of 84,472 beds. The number of patients remaining in general hospitals June 30, 1863, was 9.1 per cent., and in the field 4.4 per cent. of the entire mean strength of the army, of whom 11 per cent. were sick, and 2.5 per cent. wounded. The corps of medical inspectors, by the system of inspections established, has added materially to the efficiency of the medical and hospital service, and a marked improvement in all matters of sanitary precaution and police is exhibited. Companies of the second battalion, invalid corps, have in many instances been advantageously substituted for contract nurses, attendants, and cooks in the general hospitals. Appropriations are asked for the payment of washing in those hospitals and on transports, where a sufficient number of matrons cannot be employed; for the collection and preservation of pathological specimens in the army medical museum; and for the preparation and examination of drugs, in connexion with the purveying depots. The health of the troops has been good, and the mortality less than the preceding year.

The signal corps was organized under an act of the last Congress. The average number of officers on duty is reported as one hundred and ninety-eight. The full capacity of this branch of service has not yet been developed, and different opinions as to its value seem to be entertained by commanding officers. In combined land and naval operations it has been considered useful, and commanding officers of western armies have commended it with favor. The continuance of the corps is recommended by this department, with proper restrictions upon the number of officers, and limiting them to their proper scope of duties.

The military telegraph, under the general direction of Colonel Stager and Major Eckert, has been of inestimable value to the service, and no corps has surpassed, few have equalled, the telegraph operators in diligence and devotion to their duties.

From the superintendent's report it appears that the military telegraph lines required by the government have been constructed over an extensive and scattered territory, embracing the District of Columbia, parts of the States of Pennsylvania, Ohio, Indiana, Illinois, Maryland, Delaware, Virginia, North Carolina, South Carolina, Louisiana, Mississippi, Alabama, Arkansas, Tennessee, Kentucky, Missouri, Kansas, and the Indian territories.

Under the immediate direction of Major Eckert, assistant superintendent, of the department of the Potomac, three hundred miles have been constructed during the year. Under the direction of Captain Smith, assistant superintendent, of the department of Missouri, five hundred and forty-eight miles have been constructed during the year, one mile of which was submarine. Under the direction of Captain Bruch, assistant superintendent, of the departments of the Ohio, Cumberland, and Mississippi, five hundred and ten miles have been constructed during the year. Under the direction of Captain David, assistant superintendent, of the department of Western Virginia, ninety-seven miles have been constructed during the same period. Under the direction of Captain Bulkley, assistant superintendent, of the department of the Gulf, three hundred miles have been built, one mile of which was submarine. On the first day of July, 1862, there were 3,571 miles of land and submarine lines in working order. During the fiscal year 1,755 miles of land and submarine line were constructed, making the total number of miles of land and submarine military telegraph lines in operation during the year 5,326, being length of line sufficient to girdle more than one-fifth of the circumference of the globe. By a close estimate, it appears that at least one million two hundred thousand telegrams have been sent and received over the military lines in operation during the fiscal year ending June 30, 1863, being at the rate of about thirty-three hundred per diem. These messages have varied in length from ten to one thousand words and upwards, and generally were of an urgent or most important character.

Pursuant to acts of Congress passed February 16, 1863, and July 12, 1862, three commissioners were appointed to examine and report upon all claims arising under the act of March 25, 1862, entitled "An act to secure to the officers and men actually employed in the western department, or department of Missouri, their pay, bounty, and pension." The sum of one hundred thousand dollars, or so much as should be necessary, was appropriated by an act passed May 14, 1862, to pay the claims awarded. The commissioners have reported in favor of claims amounting to the sum of eight hundred thousand six hundred and twelve dollars and thirteen cents. No power of apportionment being vested in the department, further legislation or a larger appropriation will be required to carry these acts into effect.

Many claims are presented to the department for the use of land occupied by the government as forts, camping grounds, and other public works, for forage and other property used or injured by the troops. Some of these claims are just, others doubtful, and many exorbitant or fraudulent. The department has no mode of investigating them, and no appropriation to pay them. It is submitted that provision should be made by act of Congress for their speedy adjustment and payment.

Diligent effort has been made for the enforcement of discipline, the detection of frauds, and their prevention and punishment by summary dismissal, or by the conviction and sentence of guilty parties by court-martial and military commission. In this respect much has been accomplished by the judge advocate general and his assistants. From his report it appears that, since the commencement of the rebellion, vast as has been the increase of the duties and labors of his office, there has been no legislative provision enlarging the instrumentalities for their performance. The machinery of the office remains as when the army consisted but of some thirteen thousand men. This condition of things is the more striking when it is remembered that in every other branch of the military service legislation has kept pace with the wants created by the emergencies of the war. It is essential that the force of this office be increased to meet the emergencies of the service. The following is a summary of the business despatched in the judge advocate general's office from the 1st September, 1862, to 1st November, 1863, a period of fourteen months:

Number of records of trials by general courts-martial and military commissions reviewed, 17,357. Number of reports made as to the regularities of the proceedings, on applications for restoration to the service, and for the pardon of offenders, and remission or commutation of sentences, 2,318. Miscellaneous reports on other questions referred to the office, 172.

While many of these reports are brief, many are long and elaborate, involving an examination of complicated masses of fact, and of difficult legal questions. As recorded, they occupy about two thousand quarto pages.

It gives me pleasure to bear witness to the general diligence, ability, and fidelity manifested by the chiefs of the several bureaus of this department. Whatever success may have attended its administration is, in a great measure, due to them and their subordinates.

In conclusion, I may be permitted to express the hope that the next annual report from this department may announce the complete overthrow of the rebellion, and the restoration of peace and the establishment of the Union on a sure foundation in all the bounds of the United States.

Respectfully submitted,

EDWIN M. STANTON,
Secretary of War.

ANNUAL REPORT

OF

THE GENERAL-IN-CHIEF.

HEADQUARTERS OF THE ARMY,
Washington, D. C., November 15, 1863.

SIR: In compliance with your orders, I submit the following summary of military operations since my last annual report:

DEPARTMENT OF WEST VIRGINIA AND ARMY OF THE POTOMAC.

When General Burnside relieved General McClellan from his command, on the 7th of November of last year, the army of the Potomac was on the south side of the Potomac, under instructions to pursue Lee by a flank march on the interior line to Richmond, hugging closely to the Blue Ridge, so as to observe its passes and to give battle to the enemy whenever an opportunity occurred. On reaching Warrenton, however, General Burnside proposed to give up this pursuit of Lee's army towards Richmond and to move down the north side of the Rappahannock to Falmouth, and establish a new base of supplies at Aquia Creek or Belle Plain. This proposed change of base was not approved by me, and in a personal interview at Warrenton I strongly urged him to retain his present base and continue his march towards Richmond in the manner pointed out in the President's letter of October 13 to General McClellan.

General Burnside did not fully concur in the President's views, but finally consented to so modify his plan as to cross his army by the fords of the Upper Rappahannock, and then move down and seize the heights south of Fredericksburg, while a small force was to be sent north of the river to enable General Haupt to reopen the railroad and to rebuild the bridges, the materials for which were nearly ready in Alexandria. I, however, refused to give any official approval of this deviation from the President's instructions until his assent was obtained. On my return to Washington, on the 13th, I submitted to him this proposed change in the plan of campaign, and on its receiving his assent, rather than approval, I telegraphed on the 14th authority to General Burnside to adopt it. I here refer, not to General Burnside's written plan to go to Falmouth, but to that of crossing the Rappahannock above its junction with the Rapidan.

It has been inferred from the testimony of General Burnside before the congressional committee on the conduct of the war, that his plan of marching his whole army on the north of the Rappahannock from Warrenton to Falmouth had been approved by the authorities in Washington, and that he expected, on his arrival there, to find supplies and pontons, with gunboats to cover his crossing. In the first place, that plan was never approved, nor was he ever authorized to adopt it. In the second place, he could not possibly have expected supplies and pontons to be landed at points then occupied in force by the enemy. Again, he was repeatedly informed that gunboats could not, at that time, ascend the Rappahannock to Fredericksburg.

General Burnside did not commence his movement from Warrenton till the 15th, and then, instead of crossing the Rappahannock by the fords, as he was expected to do, he marched his whole army down on the north bank of that river, his advance reaching Falmouth on the 20th. Lee's army, in the mean time, moved down the south side of the river, but had not occupied Fredericksburg on the 21st. The river was at this time fordable a few miles above the town, and General Sumner asked permission to cross and occupy the heights, but it was refused; and no attempt was made to effect the passage till the 11th of December, by which time Lee's army had been concentrated and strongly intrenched. This passage, however, was effected without serious opposition, by the right wing and centre under Sumner and Hooker at Fredericksburg, and the left wing under Franklin on bridges established some miles below. It was intended that Franklin's grand division, consisting of the corps of Reynolds and Smith, should attack the enemy's right and turn his position on the heights in rear of Fredericksburg, while Sumner and Hooker attacked him in front. But, by some alleged misunderstanding of orders, Franklin's operations were limited to a mere reconnoissance, and the direct attacks of Sumner and Hooker were unsupported. The contest on the right wing during the 13th was continued till half past five p. m., when our men were forced to fall back, after suffering terrible losses. Both armies remained in position till the night of the 15th, when General Burnside withdrew his forces to the north side of the Rappahannock.

General Burnside has been frequently requested to make an official report of these operations, but has furnished no information beyond that contained in his brief telegrams sent from the field, in one of which he uses the following language: "The fact that I decided to move from Warrenton to this line, rather against the opinion of the President, the Secretary of War, and yourself, and that you have left the whole movement in my hands without giving me orders, makes me the more responsible."

The loss of the rebels in this battle is not known. As they were sheltered by their fortifications, it was probably less than ours, which, as officially reported, was 1,138 killed, 9,105 wounded, and 2,078 missing. Most of the missing and many of the slightly wounded soon rejoined their regiments and reported for duty.

It was alleged at the time that the loss of this battle resulted from the neglect to order forward the ponton train from Washington. This order was telegraphed by me from Warrenton to Brigadier General Woodbury, then in Washington, on the 12th of November, and was promptly acted on by him. General Burnside had supposed that the ponton train was then in Washington or Alexandria, while it was still on the Potomac at Berlin and Harper's Ferry, General Burnside's order to send it to Washington not having been received by the officer left in charge there. General Burnside had only allowed time for transporting his pontons from Alexandria, whereas they had first to be transported to that place from Berlin. The delay was, therefore, entirely unavoidable, and on investigation of the matter by General Burnside, General Woodbury was exonerated from all blame.

General Hooker relieved General Burnside from his command on the 25th of January, but no advance movement was attempted till near the end of April, when a large cavalry force under General Stoneman was sent across the Upper Rappahannock towards Richmond, to destroy the enemy's communications, while General Hooker with his main army crossed the Rappahannock and the Rapidan above their junction and took position at Chancellorsville. At the same time General Sedgwick crossed near Fredericksburg, and stormed and carried the heights.

A severe battle took place on the 2d and 3d of May, and on the 5th our army was again withdrawn to the north side of the river. For want of official data I am unable to give any detailed accounts of these operations or of our losses.

It is also proper to remark in this place that from the time he was placed in the command of the army of the Potomac till he reached Fairfax Station, on the 16th of June, a few days before he was relieved from the command, General Hooker reported directly to the President and received instructions directly from him. I received no official information of his plans or of their execution.

In the early part of June, Lee's army moved up the south bank of the Rappahaunock, occupied the gaps of the Blue Ridge, and threatened the valley of the Shenandoah. General Hooker followed on an interior line by Warrenton Junction, Thoroughfare Gap, and Leesburg; but the operations of both armies were so masked by the intervening mountains that neither could obtain positive information of the force and movements of the other. Winchester and Martinsburg were at this time occupied by us simply as outposts. Neither place was susceptible of a good defence. Directions were therefore given, on the 11th of June, to withdraw these garrisons to Harper's Ferry. But these orders were not obeyed, and on the 13th Winchester was attacked and its armament and a part of the garrison captured. Lee now crossed the Potomac, near Williamsport, and directed his march upon Harrisburg. General Hooker followed on his right flank, covering Washington and Baltimore. On reaching Frederick, Maryland, on the 28th of June, he was, at his own request, relieved from the command, and Major General Meade appointed in his place.

During these movements, cavalry skirmishes took place at Beverly Ford, Brandy Station, Berryville, and Aldie, some of which were quite severe, but, in the absence of detailed reports, I am unable to give the losses on either side.

When General Meade, under the orders of the President, took command of the army of the Potomac, on the 28th of June, it was mainly concentrated at Frederick, Md. Lee's army was supposed to be advancing against Harrisburg, which was garrisoned by raw militia, upon which little reliance could be placed. Ewell's corps was on the west side of the Susquehannah, between that place and Columbia; Longstreet's corps was near Chambersburg, and Hill's corps between that place and Cashtown. Stuart's cavalry was making a raid between Washington and Frederick, cutting Meade's line of supplies, and capturing his trains.

Our force at Harper's Ferry at this time was supposed to be about 11,000. It was incorrectly represented to General Meade to be destitute of provisions, and that he must immediately supply it, or order the abandonment of the place. Accordingly, a few hours after he assumed the command, he assented to an order, drawn up by an officer of General Hooker's staff, directing General French to send 7,000 men of the garrison to Frederick, and with the remainder, estimated at 4,000, to remove and escort the public property to Washington. This order, based on erroneous representations, was not known in Washington till too late to be countermanded. It, however, was not entirely executed, when General Meade very judiciously directed the re-occupation of that important point.

On the 29th General Meade's army was put in motion, and at night was in position; its left at Emmettsburg, and right at New Windsor. The advance of Buford's cavalry was at Gettysburg, and Kilpatrick's division at Hanover, where it encountered Stuart's cavalry, which had passed around the rear and right of our army without meeting any serious opposition.

On the 30th, the 1st, 3d, and 11th corps were concentrated at Emmettsburg, under General Reynolds, while the right wing moved up to Manchester. Buford reported the enemy in force on the Cashtown road, near Gettysburg, and Reynolds moved up to that place on the 1st of July. He found our cavalry warmly engaged with the enemy, and holding him in check on the Cashtown road. Reynolds immediately deployed the advanced division of the 1st corps, and ordered the 11th corps to move promptly to its support. Wadsworth's division had driven back the enemy some distance, and captured a large number of prisoners, when General Reynolds fell, mortally wounded. The arrival of Ewell's corps, about this time, by the York and Harrisburg roads, compelled General Howard, upon whom the command devolved, to withdraw his force, the 1st and 11th corps, to the cemetery ridge, on the south side of Gettysburg. About 7 p. m. Generals Sickles and Slocum arrived on the field with the 3d and 12th corps, which took position, one on the left and the other on the right of the new line. The battle for the day, however, was over. General Meade arrived on the field during the night with the reserves, and posted his troops in line of battle: the 1st corps on the right; the 11th corps next; then the 12th corps, which crossed the Baltimore pike; the 2d and 3d corps on the cemetery ridge, on the left of the 11th corps. The 5th corps, pending the arrival of the 6th, formed the reserve. On the arrival of the latter, about 2 o'clock p. m., it took the place of the 5th, which was ordered to take position on the extreme left. The enemy massed his troops on an exterior ridge, about a mile and a half in front of that occupied by us. General Sickles, misinterpreting his orders, instead of placing the 3d corps on the prolongation of the 2d, had moved it nearly three-fourths of a mile in advance—an error which nearly proved fatal in the battle. The enemy attacked this corps on the 2d with great fury, and it was likely to be utterly annihilated, when the 5th corps moved up on the left, and enabled it to reform behind the line it was originally ordered to hold. The 6th corps and a part of the 1st were also opportunely thrown into this gap, and succeeded in checking the enemy's advance. About sunset the rebels retired in confusion and disorder. At 8 p. m. an assault was made from the left of the town, which was gallantly repelled by the 1st, 2d, and 11th corps.

On the morning of the 3d we regained, after a spirited contest, a part of our line on the right, which had been yielded to sustain other points on the 2d. About 1 p. m. the enemy opened an artillery fire of 125 guns on our centre and left. This was followed by an assault of a heavy infantry column on our left and left centre, which was successfully repulsed, with terrible loss to the enemy. This terminated the battle, and the rebels retired defeated from the field.

The opposing forces in this sanguinary contest were nearly equal in numbers, and both fought with the most desperate courage. The commanders were also brave, skilful, and experienced, and they handled their troops on the field with distinguished ability. But to General Meade belongs the honor of a well-earned victory in one of the greatest and best fought battles of the war.

On the morning of the 4th the enemy apparently occupied a new line in front of our left, but in reality his army had commenced its retreat, carrying off a part of his wounded. His lines, however, were not entirely evacuated till the morning of the 5th, when the cavalry and the 6th corps were sent in pursuit. The days of the 5th and 6th were employed by General Meade in succoring the wounded and burying the dead left on the battle-field. He then started in pursuit of Lee, by a flank movement upon Middletown. In the mean time General French had reoccupied Harper's Ferry, destroyed the enemy's pontoon train at Williamsport and Falling Waters, and captured its guards.

Halting a day at Middletown, General Meade crossed the South Mountain, and, on the 12th, found the enemy occupying a strong position on the heights of Marsh Run, in front of Williamsport. Not being attacked in this position, with the swollen waters of the Potomac in his rear, without any means of crossing his artillery, and where a defeat must have caused the surrender of his entire army, Lee had time to construct a ponton bridge with lumber collected from canal boats and the ruins of wooden houses, and on the morning of the 14th his army had crossed to the south side of the river. His rear guard, however, was attacked by our cavalry, and suffered considerable loss.

Thus ended the rebel campaign north of the Potomac, from which important political and military results had been expected.

Our own loss in this short campaign had been very severe, viz: 2,834 killed, 13,709 wounded, and 6,643 missing—in all, 23,186. We captured three guns, 41 standards, 13,621 prisoners, 28,178 small arms. The entire loss of the enemy is not known, but judging from the numbers of his dead and wounded left on the field, it must have been much greater than ours.

After crossing the Potomac, Lee continued his retreat up the valley of the Shenandoah and through the gaps of the Blue Ridge till he reached the south bank of the Rapidan, near Orange Court-House, where he took a defensive position to dispute the crossing of the river. General Meade continued his flank pursuit by Harper's Ferry, Berlin, and Warrenton, till he reached Culpepper Court-House, where he halted his army, not deeming it prudent to cross the river and attack the enemy, who was now intrenched on the south bank, which completely commanded the approaches on the north side. During this advance several cavalry skirmishes took place, but without serious loss on either side.

A considerable part of Lee's army was now withdrawn to re-enforce Bragg in the west. But with his diminished numbers he assumed a threatening attitude against Meade; manœuvered to turn his flank, and forced him to fall back to the line of Bull Run. Having destroyed the Orange and Alexandria Railroad from the Rapidan to Manassas, the rebels again fell back to their former position near Orange Court-House.

During these operations there were several severe engagements between detached forces, but no general battle—October 10th and 11th, at Robertson's river; 12th, at Brandy Station; 14th, at Bristoe Station; 19th, at Buckland Mills; 24th, at Bealton and the Rappahannock bridge; and the 7th of November, on the south bank of that river. Our loss at Bristoe Station was 51 killed and 329 wounded. We captured 5 cannon, 2 colors, and 450 prisoners. In the several skirmishes between the 9th and 23d of October the casualties in our cavalry corps were 74 killed, 316 wounded, and 885 missing. The enemy's loss is not known, but must have been heavy, as we captured many prisoners.

While Lee was threatening Meade's army by Warrenton and Thoroughfare Gap, Imboden descended the valley of the Shenandoah and surprised a small garrison at Charlestown, capturing three or four hundred prisoners. Troops sent out from Harper's Ferry forced him to immediately retreat.

On the 7th of November Generals Sedgwick and French attacked the enemy at Rappahannock Station and Kelly's Ford, capturing several redoubts, 4 guns, 8 battle-flags, and about 2,000 prisoners. Our loss in killed and wounded was 370. The enemy now retreated to his old position south of the Rapidan.

The operations of our troops in West Virginia are referred to here as being intimately connected with those of the army of the Potomac. The force being too small to attempt any important campaign by itself, has acted mostly upon the defensive, in repelling raids, and breaking up guerilla bands.

When Lee's army retreated across the Potomac, in July last, Brigadier General Kelley concentrated all his available force on the enemy's flank, near Clear Springs, ready to co-operate in the proposed attack by General Meade. They also rendered valuable services in the pursuit after Lee had effected his passage of the river.

On the 24th of July Colonel Toland attacked the enemy at Wytheville, on the Tennessee and Virginia railroad, capturing 2 pieces of artillery, 700 muskets, and 125 prisoners. Our loss was 17 killed and 61 wounded. Enemy's killed and wounded reported to be 75.

In August, General Averill attacked a rebel force under General Sam. Jones, at Rocky Gap, in Greenbrier county, capturing 1 gun, 150 prisoners, and killing and wounding some 200. Our loss in killed, wounded, and missing was 130.

On the 11th of September, Imboden attacked a small force of our troops at Morefield, wounding 15, and capturing about 150.

On the 5th of November General Averill attacked and defeated the enemy near Lewisburg, capturing 3 pieces of artillery, over 100 prisoners, and a large number of small arms, wagons, and camp equipage. The enemy's loss in killed and wounded is estimated at 300.

DEPARTMENT OF VIRGINIA AND NORTH CAROLINA.

Our force in North Carolina during the past year has been too small for any important operations against the enemy, and consequently has acted mostly on the defensive, holding the important positions previously captured from the rebels. Nevertheless, General Foster has given much annoyance to the enemy, and taken every favorable opportunity to threaten and cut his lines.

In December last he marched against Kinston, and, on the 14th, defeated the enemy and captured that place. He then moved up the south side of the Neuse river to Goldsboro', burned the railroad bridge at that place, and tore up much of the railroad between the river and Mount Olive. He captured 496 prisoners and 9 pieces of artillery. His loss was 90 killed, 478 wounded, and 9 missing.

In March the rebel General Pettigrew, with a large force of infantry and artillery, made demonstrations on Newberne, but was forced to abandon the attempt upon that place. General Foster's loss was only two killed and four wounded.

In April General Hill laid siege to Washington, on Tar river. The place had only a small garrison and was but slightly fortified. General Foster, however, immediately directed all his energies to strengthen the works, so as to resist any assault, till re-enforcements arrived from Newberne, to raise the siege. There is no report of the losses on either side.

An expedition sent against a rebel camp at Gum Swamp in May, which captured 165 prisoners and military stores, and another in July, against Rocky Mount, on Tar river, which destroyed the bridge at that place, and a large amount of rebel property, terminate the military operations in that State to the present time.

On being compelled to abandon his attempt upon Washington, the rebel General Hill marched toward the Nansemond to re-enforce Longstreet, who was investing Suffolk. Failing in his direct assaults upon this place, the enemy proceeded to establish batteries for its reduction. General Peck made every preparation for defence of which the place was capable, and by vigorous and well-timed sorties kept the enemy at a distance, and retarded the construction of his works, till finally the attempt was abandoned. Our loss in these operations was 44 killed, 202 wounded, and 14 missing. We captured 400 prisoners and five guns during the siege.

As Suffolk possessed no advantages as a military post, and was not susceptible of a good defence, the garrison was afterwards withdrawn within the new lines constructed around Norfolk.

When the rebel army was moving north upon Maryland and Pennsylvania, General Dix sent all of his available force from Norfolk and Fort Monroe up the York river for the purpose of cutting off Lee's communications with Richmond, and of attacking that place, which was then defended by only a handful of militia. The expedition, however, failed to accomplish a single object for which it had been fitted out; the failure resulting, it was alleged, from the inefficiency of one of the generals in command. General Dix therefore ordered its return, and sent the troops of which it was composed to re-enforce the army of General Meade, north of the Potomac.

On the 5th of October Brigadier General Wistar was sent, with a small force, aided by gunboats, to Mathew county, Virginia, to break up a rebel party known as the "confederate volunteer coast guard," which was engaged in smuggling goods across the Chesapeake from Maryland and the Eastern Shore. Most of these "coast guards" were absent at the time, but the expedition resulted in capturing 150 boats and schooners and 80 head of beef cattle. The navy has given efficient aid in all the operations in this department.

DEPARTMENT OF THE SOUTH.

The withdrawal last year of most of our troops in South Carolina, to reenforce General McClellan on the Peninsula, compelled the commanding general of that department to confine himself mainly to the defence of the points which he then occupied.

An attack upon Fort Sumter and Charleston had long been in contemplation by the Navy Department, and in March last it was represented that the operations of the iron-clads and monitors would be greatly facilitated by a land force prepared to assist the attack and to occupy any work reduced by the navy. Accordingly General Foster, with a considerable force and a large siege equipage, which had been prepared for another purpose, was sent to assist in this naval attack. It was thought that his talents and experience as an engineer officer, and his personal knowledge of the localities and defensive works of Charleston harbor, rendered him peculiarly suited for this duty; but not proving acceptable to the commanding general of the department, he was permitted to return to his command in North Carolina, leaving his troops and siege preparations in the department of the south.

The naval attack on Fort Sumter took place on the 7th of April, but being unsuccessful, nothing apparently remained to be done by the land forces. A siege of Charleston and its defences by land had never been contemplated, and therefore was no part of the plan.

It was now represented by the Navy Department that a second attack upon Fort Sumter and Charleston was preparing, and that its success required the military occupation of Morris island, and the establishment of land batteries on that island to assist in the reduction of Fort Sumter. The establishment of these batteries and the reduction of the enemy's works—Fort Wagner and Battery Gregg—being a matter of engineering skill, Brigadier General (now major general) Q. A. Gillmore was selected to command the land forces engaged in these operations. In addition to being an educated and skilful military engineer, he had had considerable experience in the special duties required in these operations.

General Gillmore, despite the enemy's defensive works, landed his force on Morris island on the 10th of July, and immediately commenced the slow and difficult operations of conducting the siege of Fort Wagner and establishing batteries against Fort Sumter. Without, however, waiting for the reduction of the former, he opened, on the 17th of August, his fire on the latter, and, on the 23d, after seven days' bombardment, Fort Sumter was reported "a shapeless and harmless mass of ruins." Being under the fire of other forts of the enemy and inaccessible by land, our troops could not occupy it, and a few guns have since been temporarily remounted; but they have been as often silenced.

General Gillmore now vigorously pushed forward his saps against Fort Wagner, and on the morning of September 7th took possession of that place, and also of Battery Gregg, most of the garrison having made their escape in boats during the night. He captured, in all, thirty-six pieces of artillery and a large amount of ammunition.

General Gillmore's operations have been characterized by great professional skill and boldness. He has overcome difficulties almost unknown in modern sieges. Indeed, his operations on Morris island constitute a new era in the science of engineering and gunnery. Since the capture of Forts Wagner and Gregg he has enlarged these works and established powerful batteries, which effectually command Fort Sumter, and can render efficient aid to any naval attack upon Charleston. They also control the entrance to the harbor.

DEPARTMENT OF THE GULF.

Major General Banks took command of the department of the Gulf on the 17th of December. Almost immediately on assuming command he ordered a detachment of troops to Galveston, Texas, to occupy that place under the protection of our gunboats. Colonel Burrill, with three companies of the 42d Massachusetts volunteers, the advance of the expedition, arrived at that place on the evening of the 24th of December. On consultation with the commander of the blockading force, he landed his men upon the wharf and took possession of the city.

On the 1st of January, before the arrival of the remainder of our forces, the rebels made an attack by land with artillery and infantry, and by water with three powerful rams. Colonel Burrill's command of 260 men were nearly all killed and taken prisoners; the Harriet Lane captured, and the flag-ship Westfield was blown up by her commander to prevent her falling into the hands of the enemy. The rebels also captured the coal transports and a schooner. The commanders of the Harriet Lane and the Westfield and a number of other naval officers and men were killed. The remainder of the expedition did not leave New Orleans till December 31, and arrived off Galveston on the 2d of January, the day after our forces there had been captured and destroyed by the enemy. Fortunately they did not attempt to land, and returned to New Orleans in safety. It is proper to remark that this expedition was not contemplated or provided for in General Banks's instructions.

On the 11th of January General Weitzel, with a force of infantry and artillery, aided by the gunboats under Lieutenant Commanding Buchanan, crossed Berwick bay, and attacked the rebel gunboat Cotton, in the Bayou Teche. This gunboat, being disabled by the fire of our naval and land forces, was burned by the rebels.

The loss of General Weitzel's command in this expedition was six killed and twenty-seven wounded. A number were killed and wounded on our gunboats, and among the former, Lieutenant Commanding Buchanan.

On learning the capture of the Queen of the West by the rebels above Port Hudson, and their movements in Red river and the Teche, Admiral Farragut determined to run past the enemy's batteries, while the forces at Baton Rouge made a demonstration on the land side of Port Hudson. The demonstration was made, and, March 14th, Admiral Farragut succeeded in passing the batteries with the Hartford and Albatross; the Monongahela and Richmond fell back, and the Mississippi grounded, and was blown up by her commander. Had our land forces invested Port Hudson at this time, it could have been easily reduced, as its garrison was weak. This would have opened communication by the Mississippi river with General Grant at Vicksburg. But the strength of the place was not then known, and General Banks resumed his operations by the Teche and Atchafalaya.

In the latter part of March, Colonel Clarke was sent with a small force up the Pontchatoula, and destroyed the railroad bridge at that place. He captured a rebel officer and four privates, and three schooners loaded with cotton. His loss was six wounded. At the same time General Nickerson was sent to the Amite river to destroy the Jackson railroad. He proceeded as far as Camp Moore, captured forty-three prisoners, a considerable amount of cotton, and destroyed valuable rebel manufactories.

In his operations up the Teche and Atchafalaya, General Banks encountered the enemy under Sibley, Taylor, and Mouton at several points, and defeated them in every engagement. Butte à la Rose was captured, with a garrison and two heavy guns, by the gunboats under Lieutenant Commanding T. Cooke, of the navy. General Banks reached Alexandria on the 8th of May, the enemy retreating towards Shreveport and into Texas. In this expedition General Banks reports the capture of two thousand prisoners, twenty-two pieces of artillery, two transports and a large amount of public property. We destroyed three gunboats and eight transports. Our own loss in the different engagements with the enemy was "very slight," numbers not given.

General Banks now returned to the Mississippi river, crossed his army to Bayou Sara, where he formed a junction, May 23, with General Augur's forces from Baton Rouge. The latter had an engagement with the enemy on Port Hudson Plains on the 22d, in which he lost nineteen killed and eighty wounded. Port Hudson was immediately invested. While awaiting the slow operations of a siege, General Banks made two unsuccessful assaults. Finally, on the 8th of July, the place unconditionally surrendered. We captured 6,233 pisoners, fifty-one pieces of artillery, two steamers, 4,400 pounds of cannon powder, 5,000 small arms, 150,000 rounds of ammunition, &c., &c. Our loss from the 23d to 30th May, including the assault of the 27th, as reported, was about 1,000.

Being re-enforced from General Grant's army, on the termination of the Mississippi campaign, General Banks sent an expedition under General Franklin to occupy the mouth of the Sabine river, in Texas. It reached the entrance to the harbor on the 8th of September, and the gunboats engaged the enemy's batteries; but two of them, the Clifton and Sachem, being disabled and forced to surrender, the others retreated, and the whole expedition returned to Brashear City. The officers and crew of the gunboats, and about ninety sharpshooters, who were on board, were captured, and our loss in killed and wounded was about thirty. After a long delay at Brashear City, the army moved forward by Franklin and Vermillionville, and at last account occupied Opelousas.

DEPARTMENT OF THE TENNESSEE.

At the date of my last annual report Major General Grant occupied West Tennessee and the northern boundary of Mississippi. The object of the campaign of this army was the opening of the Mississippi river, in conjunction with the army of General Banks. General Grant was instructed to drive the enemy in the interior, as far south as possible, and destroy their railroad communications; then to fall back to Memphis, and embark his available forces on transports, and, with the assistance of the fleet of Admiral Porter, reduce Vicksburg. The first part of this plan was most successfully executed, but the right wing of the army sent against Vicksburg, under Major General Sherman, found that place much stronger than was expected. Two attacks were made on the 28th and 29th of December, but failing in their object, our troops were withdrawn, and while waiting for re-enforcements from General Grant, moved up the Arkansas river to Arkansas Post, which place was, with the assistance of the gunboats, captured on the 11th of January. Our loss at Vicksburg was 191 killed, 982 wounded, and 756 missing; at Arkansas Post, 129 killed, 831 wounded, and 17 missing. We captured at the latter place 5,000 prisoners, 17 cannon, 3,000 small arms, 46,000 rounds of ammunition, and 563 animals.

General Grant now assumed the immediate command of the army on the Mississippi, which was largely re-enforced. Being satisfied by the result of General Sherman's operations that the north line of the enemy's works was too strong to be carried without a very heavy loss, he directed his attention to opening the canal, which had been commenced the year before by General Williams, across the peninsula, on the west bank of the river. This canal had been improperly located, its upper terminus being in an eddy, and the lower terminus being exposed to the enemy's guns. Nevertheless, it was thought that it could be completed sooner than a new one could be constructed. While working parties, under Captain Prime, chief engineer of that army, were diligently employed upon this canal, General Grant directed his attention to several other projects for turning the enemy's position. These are fully described in his official report.

The canal proving impracticable, and his other plans being unsuccessful, he determined to move his army by land down the west bank of the river some seventy miles, while transports for crossing should run past the enemy's batteries at Vicksburg. The danger of running the batteries being very great, and the roads on the west side in horrible condition, this was a difficult and hazardous expedient, but it seemed to be the only possible solution of the problem. The execution of the plan, however, was greatly facilitated by Admiral Farragut, who had run two of his vessels past the enemy's batteries at Port Hudson and Grand Gulf, and cleared the river of the enemy's boats below Vicksburg; and finally, through the indomitable energy of the commanding general and the admirable dispositions of Admiral Porter for running the enemy's batteries, the operation was completely successful.

The army crossed the river at Bruinsburg April 30; turned Grand Gulf, and engaged the enemy near Port Gibson on the 1st, and at Fourteen-Mile creek on the 3d of May. The enemy was defeated in both engagements, with heavy loss. General Grant then moved his forces, by rapid marches, to the north, in order to separate the garrison of Vicksburg from the covering army of Johnston. This movement was followed by the battles of Raymond, May 12th; of Jackson, May 14th; of Champion's Hill, May 16th, and Big Black River bridge, May 17th—in all of which our troops were victorious. General Grant then proceeded to invest Vicksburg.

In order to facilitate General Grant's operations by destroying the enemy's line of communication and prevent the early concentration of any re-enforcements, Colonel (now brigadier general) Grierson was sent with a cavalry force from La Grange, on the 17th of April, to traverse the interior of the State of Mississippi. This expedition was most successfully conducted; it destroyed many of the enemy's railroad bridges, depots, and much rolling stock, and reached Baton Rouge, Louisiana, in safety, on the 2d of May.

On returning to Vicksburg, General Grant found his forces insufficient to entirely invest the enemy's works; there was, therefore, danger that the two bodies of the enemy under Pemberton and Johnston might yet effect a junction, as it was known that the latter was being largely re-enforced from Bragg's army in Middle and East Tennessee. Under these circumstances General Grant determined to attempt to carry the place by assault. Two unsuccessful attacks were made May 19th and 22d, but as re-enforcements reached him a few days after, sufficiently large to enable him to completely invest the rebel defences, he resorted to the slower but more certain operations of a regular siege. By the 3d of July his saps were so far advanced as to render his success certain, and on that day General Pemberton proposed an armistice and capitulation, which were finally accepted, and Vicksburg surrendered on the 4th of July.

In the language of General Grant's official report, the results of this short campaign were "the defeat of the enemy in five battles outside of Vicksburg; the occupation of Jackson, the capital of the State of Mississippi; and the capture of Vicksburg and its garrison, and munitions of war—a loss to the enemy of thirty-seven thousand (37,000) prisoners, among whom were fifteen general officers; at least ten thousand (10,000) killed and wounded, and among the killed Generals Tracy, Tilghman, and Green, and hundreds, and perhaps thousands, of stragglers, who can never be collected and organized. Arms and munitions of war for an army of sixty thousand men have fallen into our hands, besides a large amount of other public property, consisting of railroads, locomotives, cars, steamboats, cotton, &c., and much was destroyed to prevent our capturing it.

"Our losses in the series of battles may be summed up as follows:

	Killed.	Wounded.	Missing.
Port Gibson	130	718	5
Fourteen-Mile creek (skirmish)	4	24	...
Raymond	69	341	32
Jackson	40	240	6
Champion's Hill	426	1,842	189
Big Black railroad bridge	29	242	2
Vicksburg	545	3,688	303

"Of the wounded, many were but slightly wounded, and continued on duty; many more required but a few days or weeks for their recovery. Not more than one-half of the wounded were permanently disabled."

When we consider the character of the country in which this army operated, the formidable obstacles to be overcome, the number of the enemy's forces, and the strength of his works, we cannot fail to admire the courage and endurance of the troops, and the skill and daring of their commander. No more brilliant exploit can be found in military history.

It has been alleged, and the allegation has been widely circulated by the press, that General Grant, in the conduct of his campaign, positively disobeyed the instructions of his superiors. It is hardly necessary to remark that General Grant never disobeyed an order or instruction, but always carried out, to the best of his ability, every wish or suggestion made to him by the government; moreover, he has never complained that the government did not furnish him all the means and assistance in its power to facilitate the execution of any plan which he saw fit to adopt.

While the main army of the Tennessee was operating against Vicksburg, the enemy's forces on the west side of the river made unsuccessful attacks on Milliken's Bend and Lake Providence, on the 6th and 10th of June. Our loss in the former was 101 killed, 285 wounded, and 266 missing; loss in the latter not reported. It is represented that the colored troops in these desperate engagements fought with great bravery, and that the rebels treated this class of prisoners of war, as well as their officers, with great barbarity. It has not been possible, however, to ascertain the correctness of these representations in regard to the treatment of these prisoners.

After the capture of Vicksburg, General Grant reported that his troops were so much fatigued and worn out with forced marches and the labors of the siege, as to absolutely require several weeks of repose before undertaking another campaign. Nevertheless, as the exigencies of the service seemed to require it, he sent out those who were least fatigued on several important expeditions, while the others remained at Vicksburg to put that place in a better defensible condition for a small garrison.

As soon as Vicksburg capitulated, General Sherman was sent in pursuit of Johnston's forces. The latter retreated to Jackson, Mississippi, which place was taken by us on the 16th of July. Our loss was about 1,000 killed, wounded, and missing. General Sherman captured 764 prisoners, 2 rifled guns, a large amount of ammunition, and destroyed the railroads, rolling stock, &c. The enemy retreated towards the Alabama line, and General Sherman returned to Vicksburg to recuperate his forces.

A military and naval force was sent to Yazoo City on the 13th. It took 300 prisoners, captured one steamer and burned five; took six cannon, 250 small arms, and some 800 horses and mules. No loss on our side reported.

Small expeditions were also sent against Canton, Pontotoc, Grenada, and

Natchez, Mississippi. At Grenada a large amount of rolling stock was destroyed, and near Natchez General Ransom captured 5,000 head of Texas cattle, a number of prisoners and teams, and a large amount of ammunition. The other expeditions were also successful, meeting with very little opposition.

As soon as his army was supplied and rested, General Grant sent a force under General Steele to Helena to co-operate with General Schofield's troops against Little Rock, and another, under Generals Ord and Herron, to New Orleans to re-enforce General Banks for such ulterior operations as he might deem proper to undertake.

Small expeditions were also sent to the Red river, and to Harrisonburg and Monroe, on the Washita, to break up and destroy guerilla bands.

After General Grant left Vicksburg to assume the general command east of the Mississippi, General McPherson moved with a part of his force to Canton, Mississippi, scattering the enemy's cavalry and destroying his materials and roads in the centre of that State.

DEPARTMENT OF THE MISSOURI.

The withdrawal to Missouri of a large part of our forces in Arkansas, as stated in my last annual report, left the frontier of the former exposed to raids, of which the rebels were prompt to take advantage. Marmaduke, with the advance of Hindman's rebel army, moved forward with the purpose of entering the southwest of Missouri. Before the enemy could concentrate his forces for battle, Brigadier General Blunt, by forced marches, encountered him at Cane Hill, in the Boston mountains. A running fight took place on the 18th of November, 1862, in which the enemy was defeated with a heavy loss. Our casualties were four killed and thirty-six wounded.

Four days after the combat of Cane Hill, it was ascertained from reliable information that Hindman's army had crossed the Arkansas river and formed a junction with Marmaduke at Lee's creek, fifteen miles north of Van Buren, to which point the latter had retreated after the action of the 28th of November.

The united rebel force was believed to be very much greater than our own, of which two divisions were more than one hundred miles in the rear. Immediately, upon learning General Blunt's danger from an overwhelming attack of the enemy, General Herron, by forced marches, (one hundred and ten miles in three days,) arrived at Fayetteville, Arkansas, early on the morning of the 7th of December. Soon after we encountered the enemy in force at Prairie Grove, while attempting a flank movement to get between Blunt and the approaching succor, designing to crush both in succession. This skilfully devised project was fortunately frustrated by the valor and endurance of Herron's divisions, which stoutly held their ground till about two o'clock in the afternoon, when Blunt's forces arrived upon the field, and the engagement became general along the entire line and continued to be fiercely contested until dark. During the night the enemy retreated across the Boston mountains. Although the rebels suffered much more severely than ourselves, we purchased the victory with the loss of 167 killed, 798 wounded, and 183 missing, making a total loss of 1,148, of which 953 were of Herron's divisions.

Early in January, 1863, a rebel force estimated at from 4,000 to 6,000, under Marmaduke, moved upon Lawrence Mills, and proceeded, by way of Ozark, to the attack of Springfield, Missouri, to which place our small force, consisting chiefly of militia, convalescents and citizens, was compelled to fall back. This miscellaneous garrison, of only about one thousand men, obstinately defended the place most of the day of the 8th of January, with the loss of 14 killed, 145 wounded, and 5 missing—in all, 164. Under cover of the night the enemy withdrew, and our force was too feeble to make a vigorous pursuit. Another skirmish took place at Hartsville on the 11th, in which our loss was 7 killed and 64 wounded. We captured 27 prisoners.

The season was now so far advanced and the roads so impassable that further operations could not be carried on by either party.

On the 15th of July Major General Blunt crossed the Arkansas river, near Honey Springs, Indian Territory, and on the 16th attacked a superior force of rebels under General Cooper, which he completely routed, the enemy leaving their killed and wounded on the field. Our loss was 17 killed and 60 wounded, while that of the enemy was 150 killed, (buried by our men), 400 wounded, and 77 prisoners taken, besides one piece of artillery, two hundred stand of arms, and fifteen wagons.

After several skirmishes with the enemy General Blunt descended the Arkansas river, and, on the 1st of September, occupied Fort Smith, Arkansas.

The main body of our troops in the department of the Missouri had, in the early part of the season, been sent to re-enforce General Grant before Vicksburg. Taking advantage of this reduction of force, the enemy moved against Helena, and attacked that place on the 4th of July. After a severe engagement he was defeated by Major General Prentiss, with a heavy loss in killed and wounded and 1,100 prisoners. Our loss in killed, wounded and missing, was only about 250.

As soon as Vicksburg had capitulated, Major General Steele was sent with a force to Helena, with instructions to form a junction with Brigadier General Davidson, who was moving south from Missouri, by Crowley's Ridge, and drive the enemy south of Arkansas river. This junction being effected, General Steele established his depot and hospitals at Duvall's Bluff, and on the 1st of August advanced against the enemy, who fell back towards Little Rock. After several successful skirmishes he reached the Arkansas river and threw a part of his force upon the south side to threaten the enemy's communications with Arkadelphia, and take his defences in reverse. The rebels, on seeing this movement, destroyed what property they could, and, after a slight resistance, fled in disorder, pursued by our cavalry; and on the 10th of September our troops took possession of the capital of Arkansas. Our loss in killed, wounded, and missing did not exceed 100. We captured 1,000 prisoners, and such public property as the rebels had not time to destroy. After the capture of Little Rock, and while our cavalry were driving the main force of the rebels south, the enemy attempted to recapture Pine Bluff, but was repulsed with heavy loss. On the 28th of October our troops occupied Arkadelphia, the enemy retreating to Red river.

A large part of the military force in the department of the Missouri has been employed during the past year in repelling raids and in repressing the guerilla bands of robbers and murderers who have come within our lines or been organized in the country. Most of these bands are not authorized belligerents under the laws of war, but simply outlaws from civilized society. It is exceedingly difficult to eradicate these bands, inasmuch as the inhabitants of the country, sometimes from disloyalty and sometimes from fear, afford them subsistence and concealment. They usually hide themselves in the woods, and being well mounted, move rapidly from one point to another, supplying themselves by the way with provisions and fresh horses. They rob and murder wherever they go. In the recent raid of one of these bands into Kansas they burned the city of Lawrence and murdered the inhabitants, without regard to age or sex, committing atrocities more inhuman than those of Indian savages.

These are the terrible results of a border contest, incited at first for political purposes, and since increased in animosity by the civil war in which we are engaged, till all sense of humanity seems to have been lost in the desire to avenge with blood real or fancied grievances. This extraordinary condition of affairs on that frontier seems to call for the application of a prompt and severe remedy.

It has been proposed to depopulate the frontier counties of Missouri, and to lay waste the country on the border so as to prevent its furnishing any shelter or subsistence to these bands of murderers. Such measures are within the recognized laws of war; they were adopted by Wellington in Portugal, and by the Russian armies in the campaign of 1812; but they should be adopted only in case of overruling necessity. The execution of General Schofield's order on this subject has been suspended, and it is hoped that it will not be necessary hereafter to renew it.

DEPARTMENT OF THE NORTHWEST.

As soon as the season was sufficiently advanced for a campaign against the Indians, General Pope sent a column, under Brigadier General Sibley, up the Mississippi river to near our northern boundary, and thence across the country to the Missouri; and another of cavalry, under Brigadier General Sully, from Sioux City up the latter river to cut off the retreat of the hostile Indians whom General Sibley might drive before him from Minnesota and eastern Dakota. Unfortunately these movements were not well timed, and no junction was effected. A portion of the savages driven north took refuge within British territory, where our troops were not permitted to follow them. Some fled westward and were overtaken by General Sibley near Missouri Coteau, where he encountered a force of Minnesota and Dakota warriors estimated at from 2,200 to 2,500. In the engagements which followed at Big Mound and Dead Buffalo lake, the Indians were completely routed, with a heavy loss in killed and wounded, and in the destruction of their provisions and means of transportation. Our loss was five killed and four wounded. The savages who escaped crossed to the west side of the Mississippi, and General Sibley reached that river, about 40 miles below Fort Clarke, on the 29th of July, having marched a distance of some six hundred miles from St. Paul.

On the 3d of September General Sully encountered and defeated, at White Stone Hill, about 130 miles above the Little Cheyenne, a body of Indians, a part of whom had previously been engaged against Sibley's column. The savages were defeated with a heavy loss in killed and wounded and 156 prisoners. Our loss was 20 killed and 38 wounded.

With these operations the present Indian campaign was terminated. Recent hostilities in Idaho may render it necessary to send a military expedition into that Territory early in the spring.

DEPARTMENT OF THE PACIFIC.

This department has been most signally exempt from the evils of civil war, and consequently has enjoyed unexampled prosperity. Some thefts and robberies having been committed by roving bands of Indians on the overland stage route, in January last, General Conner marched with a small force to Bear river, Idaho Territory, where, on the 26th, he overtook and completely defeated them in a severe battle, in which he killed 224 of the 300, and captured 175 of their horses. His own loss in killed and wounded was 63 out of 200. Many of his men were severely injured by the frost. Since this severe punishment, the Indians in that quarter have ceased to commit depredations on the whites.

DEPARTMENT OF NEW MEXICO.

The troops in this department have been principally employed during the past year on the Indian frontier and in opening and in guarding roads to the newly discovered gold mines in Arizona. The fabulous richness of these mines has attracted large numbers of miners and traders from California and Mexico, and this hitherto barren Territory will soon become a wealthy and populous state.

DEPARTMENT OF THE OHIO.

In December last Brigadier General S. P. Carter made a cavalry raid into Eastern Tennessee and destroyed the Union and Watauga railroad bridges, a considerable amount of arms, rolling-stock, &c. He returned to Kentucky with the loss of only 10 men.

On the 30th of March Brigadier General Gillmore engaged and defeated a large rebel force under General Pegram, near Somerset, Kentucky. Our loss in killed, wounded and missing was only 30; that of the enemy estimated at 500.

In June the rebels attempted a raid into Harrison county, Indiana, but were driven back with the loss of 53 prisoners.

About the same time Colonel Sanders, with two pieces of artillery, the 1st Tennessee cavalry, and some detachments from General Carter's command, destroyed the railroad near Knoxville, and the bridges at Slate creek, Strawberry plains, and Mossy creek; captured 10 pieces of artillery, 1,000 stand of arms, and 500 prisoners. Our loss was 1 killed, 2 wounded, and a few stragglers.

About the time of Lee's invasion of Pennsylvania the rebel General John N. Morgan, with a large guerilla band, attempted a raid into Indiana and Ohio, intending probably to recross the Ohio river into West Virginia or Pennsylvania, and join Lee's army. His force consisted of six pieces of artillery and some 3,000 cavalry. This band of robbers and murderers destroyed much public and private property, and killed a number of the inhabitants of the country through which they passed, but was finally completely destroyed, nearly every man being killed or taken prisoner.

The detaching of the 9th army corps to re-enforce General Grant before Vicksburg delayed somewhat General Burnside's preparations for an active campaign in East Tennessee. The necessity, however, of co-operating with the movements of General Rosecrans compelled him to take the field without awaiting the return of this corps. His main column moved on three routes, making Kingston his objective point, which place was reached on the 1st of September. Knoxville was also occupied on the 1st by Colonel Foster, and General Shackelford moved forward to Loudon bridge, which was burned by the retreating enemy. Another small column had marched from Kentucky directly on Cumberland Gap, and by a rapid flank march from Knoxville upon that place General Burnside cut off the retreat of the garrison and forced it to surrender on the 9th of September, capturing 14 pieces of artillery and 2,000 prisoners. His infantry made this forced march of 60 miles in 52 hours. A column of cavalry at the same time ascended the valley to Bristol, driving the enemy across the Virginia line, and destroying the railroad bridges over the Holston and Watauga rivers, to prevent the enemy's return into Tennessee. The main body of Burnside's army was now ordered to concentrate on the Tennessee river, from Loudon westward, so as to connect with General Rosecrans's army, which reached Chattanooga on the 9th. Paint Rock Pass into North Carolina was also occupied by a small force. The restoration of East Tennessee to the Union was thus effected by skilful combinations, with scarcely any loss on our part.

It was now hoped that there would be no further delay in effecting a junction between the two armies of Burnside and Rosecrans, as had been previously ordered; but the country between Dalton and the Little Tennessee being still open to the enemy, General Burnside was cautioned to move down by the north bank of the river, so as to secure its fords and cover his own and Rosecrans's communications from rebel raids. With our forces concentrated near Chattanooga, the enemy would be compelled to either attack us in position or to retreat further south into Georgia, for should he attempt a flank movement on Cleveland, his own communications would be cut off and his army destroyed. Though repeatedly urged to effect this junction with the army of the Cumberland, General Burnside retained most of his forces in the upper valley, which was still threatened, near the Virginia line, by a small rebel force under General Sam. Jones.

On the 21st of September Colonel Foster had a skirmish with the enemy near Bristol, on the Virginia line, and on the 10th and 11th of October another sharp engagement took place at Blue Springs. The enemy was defeated with a heavy loss in killed and wounded and 150 prisoners; our loss was about 100. After the battle of Chickamauga, when General Rosecrans had fallen back to Chattanooga, the enemy pushed forward a column into East Tennessee to threaten Burnside's position at Loudon, and to cover a cavalry raid upon Rosecrans's communications. Unfortunately, General Burnside had occupied Philadelphia and other points on the south side of the river, with small garrisons. The enemy surprised some of these forces and captured 6 guns, 50 wagons, and some 600 or 700 prisoners. The remainder retreated to Loudon, and succeeded in holding the crossing of the river. In the mean time Jones had moved down on the north side of the Holston river to Rogersville, with some 3,500 cavalry, and surprised our garrison at that place, capturing 4 pieces of artillery, 36 wagons, and 650 men.

DEPARTMENT OF THE CUMBERLAND.

When General Rosecrans took command of the army in Kentucky it was massed near Bowling Green and Glasgow, the base of supplies being then at Louisville, which a few days later was advanced to Nashville, which was made a secondary base.

After the battle of Perrysville and our pursuit to Mount Vernon, as stated in my last report, the rebel army retreated across the Cumberland mountains, leaving a force in Cumberland Gap; then moved down the Tennessee valley to Chattanooga; and thence, by Stevenson and Tullahoma, to Murfreesboro', a distance of 400 miles, while our army had marched to Nashville, a distance of only a little over 200 miles.

On the 26th of December General Rosecrans advanced against Bragg, whose forces were at that time somewhat dispersed along the road. On the 30th our army, after heavy skirmishing *en route*, reached the vicinity of Murfreesboro', and took up a line of battle. The left, under Crittenden, crossed the next day to the east of Stone's river, while the centre, commanded by Thomas, and the right by McCook, were posted on the west bank of the river. By the plan of battle agreed upon, McCook was to hold the enemy in check on the right at least for three hours, until Crittenden crossed Stone's river, crushed the enemy's right to the east of the stream, and forced his way into Murfreesboro', taking the enemy in flank and reverse, the unsupported rebel centre being exposed at the same time to the vigorous blows of Thomas. This well-conceived programme, unfortunately, was unsuccessful, from the failure of McCook to maintain his position; our right, brigade after brigade in succession, being forced back by the enemy's heavy columns with regimental front. This retrograde movement of the right caused Crittenden to suspend his march and support our forces on the west bank of the river, the battle, on our part, changing from the offensive to the defensive. The day closed with our right and right-centre about at right angles to the first line of battle, but leaving us masters of the original ground on our left, and our new line advantageously posted, with open ground in front, swept at all points by our artillery. Though in this day's engagement the enemy had been roughly handled, our loss in men and artillery had been heavy.

On the 1st of January we waited in position the enemy's attack, but the day closed without offensive operations, except two demonstrations producing no results.

On the morning of the 2d the enemy opened four heavy batteries on our centre, and made a strong demonstration of attack a little further to the right, but a well-directed artillery fire soon silenced his batteries, and put an end to his efforts there. In the afternoon a vigorous attack was made on our left by heavy columns, battalion front, forcing us, after severe fighting, to cross to the west of the river, from which side a well-directed artillery fire, supported by infantry, was opened with terrific havoc on the enemy's masses, inflicting a loss upon him, in forty minutes, of two thousand killed and wounded. The defeated and flying enemy were pursued by five brigades until after dark. We captured four pieces of artillery and a stand of colors.

As a heavy rain, on the morning of the 3d, rendered the ploughed ground on our left impassable for artillery, no pursuit was ordered, and the day terminated without further hostilities than driving from our front the enemy's numerous sharpshooters, who greatly annoyed us from the woods and their rifle-pits.

On the 5th we occupied Murfreesboro', and pursued the enemy six or seven miles towards Manchester, but the difficulty of bringing up supplies, and the great loss of artillery horses, was thought to render further pursuit inexpedient.

Our loss in this battle was 1,533 killed, 7,245 wounded, and 2,800 missing, and 28 pieces of artillery and a large number of wagons captured by the enemy. Reported rebel loss in killed and wounded was 14,560. We captured six pieces of their artillery.

After the battle of Murfreesboro', or Stone's river, the enemy took position at Shelbyville and Tullahoma, and the winter and spring were passed in raids and unimportant skirmishes.

On the 3d of February Generals Wheeler, Forrest, and Wharton invested Fort Donelson, and demanded its capitulation. This was promptly refused by its commander, Colonel Harding. After an obstinate attack, which lasted all day, the rebels retired, with an estimated loss of 900. Our loss in the fort was 13 killed and 51 wounded.

On the 4th of March Colonel Coburn, with 1,845 men, attempted a reconnoissance from Franklin towards Springfield, encountering in his way Van Dorn's rebel column, estimated at 7,500. The enemy retreated, drawing Colonel Coburn into a gorge, where he was surrounded, and nearly all his force captured. Our loss was 1,406; that of the enemy 150 killed and 450 wounded.

On the 20th of March Colonel Hall, while on a reconnoissance, encountered and defeated the rebel General Morgan with a force of three or four thousand. Our loss was 55. The enemy left 63 on the field, but carried off his wounded, estimated at 300.

On the 25th of March the rebel General Forrest made a cavalry raid on the Nashville and Columbia railroad, burning the bridge, and capturing Colonel Bloodgood's command at Brentwood. General Green Clay Smith, arriving opportunely with about 600 cavalry, attacked the enemy in rear, and recovered a large portion of the property captured at Brentwood, pursuing the rebels to the "Little Harpeth," where they were re-enforced. His loss in this attack was 4 killed, 19 wounded, and 4 missing.

On the 10th of April a guerilla force attacked a train near Lavergne, guarded by 40 men. The cars were destroyed, and nearly half of the guard killed and wounded. At the same time Van Dorn, with a large mounted force, attacked Franklin, but was repulsed by Major General Granger, with a loss of 19 killed, 35 wounded left on the field, and 48 prisoners.

Major General Joseph J. Reynolds made a raid upon the Manchester and McMinnville railroad, destroying depots, rolling stock, supplies, and other property, and capturing 180 prisoners.

Colonel Straight, with about 1,600 men, including re-enforcements received from General Dodge at Tuscumbia, started on a raid into Georgia to cut the enemy's communications. After heavy losses in skirmishes with Forrest's cavalry, and when near his destination, he was forced to surrender.

On the 22d of May Major General Stanley made a raid upon Middleton, capturing 80 prisoners, 300 horses, 600 stands of arms, and other property.

On the 4th of June the rebel General Forrest made a raid upon Franklin, and on the 11th attacked Triune. His losses in these unsuccessful skirmishes were estimated at over 100, while ours was only 17 killed and wounded.

While General Grant was operating before Vicksburg, information, deemed reliable, was received from captured rebel official correspondence, that large detachments were being drawn from Bragg's army to re-enforce Johnson in Mississippi. Re-enforcements were sent to General Grant from other armies in the west, but General Rosecrans's army was left intact in order that he might take advantage of Bragg's diminished numbers and drive him back into Georgia, and thus rescue loyal East Tennessee from the hands of the rebels—an object which the government has kept constantly in view from the beginning of the war. I therefore urged General Rosecrans to take advantage of this opportunity to carry out his long-projected movement, informing him that General Burnside would co-operate with his force, moving from Kentucky to East Tennessee. For various reasons he preferred to postpone his movement until the termination of the siege of Vicksburg.

In order to avoid any misunderstanding of the orders given to General Rosecrans on this subject, I submit the following correspondence:

"MURFREESBORO', *Tennessee, June* 11, 1863.

"Maj. Gen. H. W. HALLECK, *General-in-Chief.*

"Your despatch of to-day received. You remember I gave you, as a necessary condition of success, an adequate cavalry force. Since that time I have not lost a moment in mounting our dismounted cavalry as fast as we could get horses. Not more than 300 remain to be mounted. The 5th Iowa, ordered up from Donaldson, arrived to-day. The 1st Wisconsin will be here by Saturday. My preliminary infantry movements have nearly all been completed, and I am preparing to strike a blow that will tell; but to show you how differently things are viewed here, I called on my corps and division commanders and generals of cavalry for answers in writing to these questions: 1st. From your best information, do you think the enemy materially weakened in our front? 2d. Do you think this army can advance, at this time, with reasonable prospect of fighting a great and successful battle? 3d. Do you think an advance advisable at this time?

"To the 1st, eleven answered, no; six, yes, to the extent of ten thousand. To the 2d, four, yes, with doubts; thirteen, no. To the 3d, not one, yes; seventeen, no.

"Not one thinks an advance advisable until Vicksburg's fate is determined. Admitting these officers to have a reasonable share of military sagacity, courage, and patriotism, you perceive that there are graver and stronger reasons than probably appear at Washington for the attitude of this army. I therefore counsel caution and patience at headquarters. Better wait a little to get all we can ready to insure the best results, if by so doing we, per force of Providence, observe a great military maxim, not to risk two great and decisive battles at the same time. We might have cause to be thankful for it; at all events, you see that, to expect success, I must have such thorough grounds, that when I say "forward," my word will inspire conviction and confidence, where both are now wanting.

"I should like to have your suggestion.

"W. S. ROSECRANS,
"*Major General.*"

"WASHINGTON, *June* 12, 1863.

"Maj. Gen. ROSECRANS, *Murfreesboro,' Tennessee.*

"GENERAL: Your telegram of yesterday is just received.

"I do not understand your application of the military maxim, 'not to fight two great battles at the same time.' It will apply to a single army, but not to two armies acting independently of each other. Johnston and Bragg are acting on interior lines between you and Grant, and it is for *their* interest, not *ours*, that they should fight at different times, so as to use the same force against both of you. It is for *our* interest to fight them, if possible, while divided. If you are not strong enough to fight Bragg with a part of his troops absent, you will not be able to fight him after the affair at Vicksburg is over and his troops return to your front.

"There is another military maxim, that 'councils of war never fight.'

"If you say that you are not prepared to fight Bragg I shall not order you to do so, for the responsibility of fighting or refusing to fight at a particular time or place must rest upon the general in immediate command. It cannot be shared by a council of war, nor will the authorities here make you fight against your will. You ask me to counsel them 'caution and patience.' I have done so very often; but after five or six months of inactivity, with your force all the time diminishing, and no hope of any immediate increase, you must not be surprised that their patience is pretty well exhausted.

"If you do not deem it prudent to risk a general battle with Bragg, why can you not harass him, or make such demonstrations as to prevent his sending more re-enforcements to Johnston?

"I do not write this in a spirit of fault-finding, but to assure you that the prolonged inactivity of so large an army in the field is causing much complaint and dissatisfaction not only in Washington, but throughout the country.

"Very respectfully, your obedient servant,

"H. W. HALLECK,
"*General-in-Chief.*"

"HEADQUARTERS DEPARTMENT OF THE CUMBERLAND,
"*Murfreesboro,' June* 21, 1863.

"Maj. Gen. H. W. HALLECK, *General-in-Chief:*

"GENERAL: In your favor of the 12th instant you say you do not see how the maxim of not fighting two great battles at the same time applies to the case of this army and Grant's.

"Looking at the matter practically, we and our opposing forces are so widely separated, that for Bragg to materially aid Johnston, he must abandon our front substantially, and then we can move to our ultimate work with more rapidity and less waste of material on natural obstacles. If Grant is defeated both forces will come here, and then we ought to be near our base.

"The same maxim that forbids, as you take it, a single army fighting two great battles at the same time, (by the way, a very awkward thing to do,) would forbid this nation's engaging all its forces in the great west at the same time, so as to leave it without a single reserve to stem the current of possible disaster. This is, I think, sustained by high military and political considerations.

"We ought to fight here if we have a strong prospect of winning a decisive battle over the opposing force, and upon this ground I shall act. I shall be careful not to risk our last reserve without strong grounds to expect success.

"W. S. ROSECRANS,
"*Major General.*"

When General Rosecrans finally determined to advance, he was permitted to select, without restriction, his own line of operation by which to reach Chattanooga, only being directed to connect his left, so far as practicable, with the army of General Burnside, and to report daily by telegraph his movements till he crossed the Tennessee river. General Burnside was also ordered to connect his right, as much as possible, with General Rosecrans's left; so that if the enemy should concentrate upon either army, the other could move to its assistance.

General Rosecrans on the 25th of June commenced a forward movement upon the enemy, well intrenched at Tullahoma, covered in front by the defiles of Duck river, a deep narrow stream with few fords or bridges, and a rough, rocky range of hills which divides the "barrens" from the lower level of Middle Tennessee. Bragg's main force occupied a strong position north of Duck river from Shelbyville, which was fortified, to Wartrace, all the gaps on the roads leading thereto being held in force.

General Rosecrans determined to render useless the rebel intrenchments by turning their right and moving on their communications at the railroad bridge on Elk river, thus compelling a battle on our own ground, or driving them on a disadvantageous line of retreat. By admirable combined movements he deceived the enemy by a threatened advance in force on their left at Shelbyville, while the mass of his army in reality seized Hoover's, Liberty, and the other gaps by hard fighting, and moved on Manchester, thus turning the right of the enemy's defences of Duck river and directly threatening Bragg, who was compelled to fall back to Tullahoma, hotly pursued by Granger, who had brilliantly carried Shelbyville on their left. Dispositions were immediately made to turn Tullahoma and fall upon the enemy's rear, but Bragg abandoned to us his intrenched camp and rapidly fell back towards Bridgeport, Alabama.

In the words of General Rosecrans's official report: "Thus ended a nine days' campaign, which drove the enemy from two fortified positions and gave us possession of Middle Tennessee, conducted in one of the most extraordinary rains ever known in Tennessee at that period of the year, over a soil that became almost a quicksand. Our operations were retarded thirty-six hours at Hoover's gap, and sixty hours at and in front of Winchester, which alone prevented us from getting possession of his communications and forcing the enemy to a very disastrous battle. These results were far more successful than was anticipated, and could only have been obtained by a surprise as to the direction and force of our movements."

Our losses in these operations were 85 killed, 462 wounded, and 13 missing, making in all 560. .

The killed and wounded of the enemy is unknown, but we took 1,634 prisoners, of which 59 were commissioned officers. We captured six pieces of artillery, many small arms, considerable camp equipage, and large quantities of commissary and quartermaster's stores.

After the expulsion of his army from Middle Tennessee, Bragg retreated across the Cumberland mountains and Tennessee river upon Chattanooga, which place was fortified, and defensive works constructed at the crossings of the river as far up as Blythe's Ferry.

Having put the railroad in condition to forward supplies, Rosecrans, on the 16th of August, commenced his advance across the Cumberland mountains, Chattanooga and its covering ridges on the southeast being his objective point. In order to command and avail himself of the most important passes, the front of his movement extended from the head of Sequatchie valley, in East Tennessee, to Athens, Alabama, thus threatening the line of the Tennessee river from Whitesbury to Blythe's Ferry, a distance of over 150 miles.

The Tennessee river was reached on the 20th of August, and Chattanooga shelled from the north bank on the 21st. Ponton, boat, raft, and trestle bridges were rapidly prepared at Caperton's Ferry, Bridgeport, mouth of Battle creek, and Shellmount, and the army, except cavalry, safely crossed the Tennessee in face of the enemy. By the 8th of September Thomas had moved on Trenton, seizing Frick's and Stevens's gaps on the Lookout mountain; McCook had advanced to Valley Head and taken Winston's gap; while Crittenden had crossed to Wanhatchie, communicating on the right with Thomas, and threatening Chattanooga by the pass over the point of Lookout mountain.

The first mountain barrier south of the Tennessee being successfully passed, General Rosecrans decided to threaten the enemy's communication with his right, while his centre and left seized the gaps and commanding points of the mountains in front. General Crittenden's reconnoissance on the 9th developed the fact that the enemy had evacuated Chattanooga on the day and night previous.

While General Crittenden's corps took peaceable possession of Chattanooga, the objective point of the campaign, General Rosecrans, with the remainder of his army, pressed forward through the difficult passes of the Lookout and Missionary mountains, apparently directing his march upon Lafayette and Rome.

On ascertaining these facts, and that General Burnside was in possession of all East Tennessee above Chattanooga, and hearing that Lee was being rapidly re-enforced on the Rapidan, it seemed probable that the enemy had determined to concentrate his forces for the defence of Richmond, or a new invasion of the north. The slight resistance made by him in East Tennessee, and his abandonment, without defence, of so important a position as Chattanooga, gave plausibility to the reports of spies and deserters from Lee's army of re-enforcements arriving there from Bragg.

Fearing that General Rosecrans's army might be drawn too far into the mountains of Georgia, where it could not be supplied, and might be attacked before re-enforcements could reach it from Burnside, I sent him, on the 11th, the following telegram:

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 11, 1863.

Major General ROSECRANS, *Chattanooga:*

General Burnside telegraphs from Cumberland gap that he holds all East Tennessee above Loudon, and also the gaps of the North Carolina mountains. A cavalry force is moving towards Athens to connect with you.

After holding the mountain passes on the west, and Dalton, or some other point on the railroad, to prevent the return of Bragg's army, it will be decided whether your army shall move further south into Georgia and Alabama.

It is reported here by deserters that a part of Bragg's army is re-enforcing Lee. It is important that the truth of this should be ascertained as early as possible.

H. W. HALLECK,
General-in-Chief.

On the same day the following telegram was sent to General Burnside:

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 11, 1863.

Major General BURNSIDE, *Cumberland Gap:*

I congratulate you on your success.

Hold the gaps of the North Carolina mountains, the line of the Holston river, or some point, if there be one, to prevent access from Virginia, and connect with General Rosecrans, at least with your cavalry.

General Rosecrans will occupy Dalton or some point on the railroad to close all access from Atlanta, and also the mountain passes on the west. This being done, it will be determined whether the movable forces shall advance into Georgia and Alabama, or into the valley of Virginia and North Carolina.

H. W. HALLECK,
General-in-Chief.

On the 12th General Rosecrans telegraphed that although he was "sufficiently strong for the enemy then in his front," there were indications that the rebels intended to turn his flanks and cut his communications. He therefore desired that Burnside should move down his infantry toward Chattanooga on his left, and that Grant should cover the Tennessee river towards Whitesbury to prevent any raid on Nashville. He was of opinion that no troops had been sent east from Bragg's army, but that Bragg was being re-enforced by Loring from Mississippi.

On the night of the 13th General Foster telegraphed from Fort Monroe that "trains of cars had been heard running all the time, day and night, for the last thirty-six hours, on the Petersburg and Richmond road, evidently indicating a movement of troops in some direction;" and on the morning of the 14th, that Longstreet's corps was reported to be going south through North Carolina. General Meade had been directed to ascertain, by giving battle if necessary, whether any of Lee's troops had left. It was not till the 14th that he could give me any information on this point, and then he telegraphed, "my judgment, formed of the variety of meagre and conflicting testimony, is, that Lee's army has been reduced by Longstreet's corps, and perhaps by some regiments from Ewell's and Hill's."

As soon as I received General Rosecrans's and General Foster's telegrams of the 12th and 13th, I sent the following telegrams to Generals Burnside, Rosecrans, Hurlburt, Grant and Sherman:

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 13, 1863.

Major General BURNSIDE, *Knoxville :*

It is important that all the available forces of your command be pushed forward into East Tennessee. All your scattered forces should be concentrated there. So long as we hold Tennessee, Kentucky is perfectly safe. Move down your infantry as rapidly as possible towards Chattanooga to connect with Rosecrans. Bragg may merely hold the passes of the mountains to cover Atlanta, and move his main army through northern Alabama to reach the Tennessee river and turn Rosecrans's right and cut off his supplies. In this case he will turn Chattanooga over to you and move to intercept Bragg.

H. W. HALLECK,
General-in-Chief.

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 13, 1863.

Major General ROSECRANS, *Chattanooga :*

There is no intention of sending General Burnside into North Carolina. He is ordered to move down and connect with you. Should the enemy attempt to turn your right flank through Alabama, Chattanooga should be turned over to Burnside, and your army, or such part of it as may not be required there, should move to prevent Bragg from re-entering Middle Tennessee. Hurlburt will aid you all he can, but most of Grant's available force is west of the Mississippi.

H. W. HALLECK,
General-in-Chief.

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 13, 1863.

Major General HURLBURT, *Memphis:*

I think from all accounts that Steele is sufficiently strong. All your available forces should be sent to Corinth and Tuscumbia to operate against Bragg should he attempt to turn Rosecrans's right and recross the river into Tennessee. Send to General Sherman at Vicksburg for re-enforcements for this purpose. General Grant, it is understood, is sick in New Orleans.

H. W. HALLECK,
General-in-Chief.

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 13, 1863.

Major General GRANT or Major General SHERMAN, *Vicksburg:*

It is quite possible that Bragg and Johnston will move through northern Alabama to the Tennessee river to turn General Rosecrans's right, and cut off his communications. All of General Grant's available forces should be sent to Memphis, thence to Corinth and Tuscumbia, to co-operate with Rosecrans should the rebels attempt that movement.

H. W. HALLECK,
General-in-Chief.

On the 14th the following telegrams were sent to Generals Foster, Burnside and Hurlburt:

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 14, 1863.

Major General FOSTER, *Fort Monroe:*

Information received here indicates that part of Lee's forces have gone to Petersburg. There are various suppositions for this. Some think it is intended to put down the Union feeling in North Carolina; others, to make an attempt to capture Norfolk; others, again, to threaten Norfolk, so as to compel us to send re-enforcements there from the army of the Potomac, and then to move rapidly against Meade. Such was the plan last spring when Longstreet invested Suffolk. It will be well to strengthen Norfolk as much as possible and to closely watch the enemy's movements. I think he will soon strike a blow somewhere.

H. W. HALLECK,
General-in-Chief.

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 14, 1863.

Major General HURLBURT, *Memphis:*

There are good reasons why troops should be sent to assist General Rosecrans's right with all possible despatch. Communicate with Sherman to assist you, and hurry forward re-enforcements as previously directed.

H. W. HALLECK,
General-in-Chief.

HEADQUARTERS OF THE ARMY,
Washington, D. C., September 14, 1863.

Major General BURNSIDE, *Knoxville:*

There are reasons why you should re-enforce General Rosecrans with all possible despatch. It is believed that the enemy will concentrate to give him battle. You must be there to help him.

H. W. HALLECK,
General-in-Chief.

In addition to General Burnside's general instructions, a number of despatches of the same purport as the above were sent to him. Generals Schofield and Pope were directed to send forward to the Tennessee line every available man in their departments; and the commanding officers in Indiana, Ohio, and Kentucky were ordered to make every possible exertion to secure General Rosecrans's line of communication. General Meade was urged to attack General Lee's army while in its present reduced condition, or at least to prevent him from sending off any more detachments.

It seemed useless to send any more troops into East Tennessee and Georgia, on account of the impossibility of supplying them in a country which the enemy had nearly exhausted. General Burnside's army was on short rations, and that of the Cumberland inadequately supplied. General Rosecrans had complained of his inadequate cavalry force, but the stables of his depots were over-crowded with animals, and the horses of his artillery, cavalry, and trains were dying in large numbers for want of forage.

As three separate armies were now to operate in the same field, it seemed necessary to have a single commander, in order to secure a more perfect co-operation than had been obtained with the separate commands of Burnside and Rosecrans. General Grant, by his distinguished services, and his superior rank to all the other generals in the west, seemed entitled to this general command; but, unfortunately, he was at this time in New Orleans, unable to take the field. Moreover, there was no telegraphic communication with him, and the despatches of the 13th, directed to him and General Sherman, did not reach them until some days after their dates, thus delaying the movement of General Grant's forces from Vicksburg. General Hurlburt, however, had moved the troops of his own corps, then in West Tennessee, with commendable promptness. These were to be replaced by re-enforcements from Steele's corps in Arkansas, which also formed part of Grant's army.

Hearing nothing from General Grant, or from General Sherman's corps at Vicksburg, it was determined, on the 23d, to detach the 11th and 12th corps from the army of the Potomac, and to send them by rail, under the command of General Hooker, to protect General Rosecrans's line of communication from Bridgeport to Nashville. It was known that these troops could not go immediately to the front. To send more men to Chattanooga, when those already there could not be fully supplied, would only increase the embarrassment, and probably cause the evacuation of that place. In other words, Hooker's command was to temporarily perform the duties previously assigned to the re-enforcements ordered from Grant's army.

We will now return to General Rosecrans's army, the main body of which we left, on the 14th, in the passes of Pigeon mountain, with the enemy concentrating his forces near Lafayette to dispute his further advance. Bragg's threatened movements to the right and left were merely cavalry raids to cut Rosecrans's line of supplies, and threaten his communications with Burnside. His main army was probably only awaiting the arrival of Longstreet's corps to give battle in the mountains of Georgia.

Of the movements of this corps, so well known to the enemy, we could get no reliable information. All we knew positively was, that one of Longstreet's divisions had arrived in Charleston to re-enforce that place. It was said that other divisions had gone to Mobile to protect it from an attack by Banks's army. But as there was no real danger of such an attack at that moment, it was more probably on its way to re-enforce Bragg's army. But the time of its arrival was uncertain, as we had no reliable information of its departure from Richmond. We knew that Bragg had been re-enforced by troops sent by Johnston from Mississippi, and it was afterwards ascertained that the rebel authorities had falsely declared as exchanged and released from parole the prisoners of war captured by Grant and Banks at Vicksburg and Port Hudson. This shameless violation of the cartel, and of the well-established usages of civilized warfare, was resorted to by the enemy in order to swell the numbers of Bragg's army in the approaching conflict.

General Rosecrans's troops were at this time scattered along an extended line from Gordon's mill to Alpine, a distance of some forty miles. By the 17th they were brought more within supporting distance, and on the morning of the 18th a concentration was begun towards Crawfish spring, but slowly executed.

The battle of Chickamauga commenced on the morning of the 19th, McCook's corps forming the right of our line of battle, Crittenden's the centre, and Thomas's the left. The enemy first attacked our left with heavy masses, endeavoring to turn it, so as to occupy the road to Chattanooga; but all their efforts proved abortive. The centre was next assailed, and temporarily driven back; but being promptly re-enforced, maintained its ground. As night approached, the battle ceased, and the combatants rested on their arms.

The attack was furiously renewed on the morning of the 20th, against our left and centre. Division after division was pushed forward to resist the attacking masses of the enemy, when, according to General Rosecrans's report, General Wood, overlooking the direction "to 'close up' on Reynolds, supposed he was to support him by withdrawing from the line and passing in the rear of General Brannan."

"By this unfortunate mistake a gap was opened in the line of battle, of which the enemy took instant advantage, and, striking Davis in flank and rear, threw his whole division into confusion." General Wood claims that the orders he received were of such a character as to leave him no option but to obey them in the manner he did. Pouring in through this break in our line, the enemy cut off our right and right centre, and attacked Sheridan's division, which was advancing to the support of our left. After gallant but fruitless efforts against this rebel torrent, he was compelled to give way, but afterwards rallied a considerable portion of his force, and, by a circuitous route, joined General Thomas, who now had to breast the tide of battle against the whole rebel army. Our right and part of the centre had been completely broken and fled in confusion from the field, carrying with them towards Chattanooga their commanders, Generals McCook and Crittenden, and also General Rosecrans, who was on that part of the line. His chief of staff, General Garfield, however, made his way to the left and joined General Thomas, who still remained immovable in his position. His line had assumed a crescent form, with its flanks supported by the lower spurs of the mountain, and here, like a lion at bay, he repulsed the terrible onsets of the enemy. About half-past three p. m. the enemy discovered a gap in the hills in the rear of his right flank, and Longstreet commenced pouring his massive column through the opening. At this critical moment Major General Gordon Granger, who had been posted with his reserves to cover our left and rear, arrived upon the field. He knew nothing of the condition of the battle, but, with the true instincts of a soldier, he had marched to the sound of the cannon. General Thomas merely pointed out to him the gap through which the enemy was debouching, when, quick as thought, he threw upon it Steadman's brigade of cavalry. In the words of General Rosecrans's official report: "Swift was the charge and terrible the conflict, but the enemy was broken. A thousand of our brave men, killed and wounded, paid for its possession, but we held the gap. Two divisions of Longstreet's corps confronted the position. Determined to take it, they successively came to the assault. A battery of six guns, placed in the gorge, poured death and slaughter into them. They charged to within a few yards of the pieces, but our grape and canister, and the leaden hail of our musketry, delivered in sparing but terrible volleys from cartridges taken, in many instances, from the boxes of their fallen companions, was too much even for Longstreet's men. About sunset they made their last charge, when our men, being out of ammunition, rushed on them with bayonet, and they gave way to return no more."

In the mean time the enemy made repeated attempts to carry General Thomas's position on the left and front, but were as often driven back with great loss. At nightfall the enemy fell back beyond the range of our artillery, leaving Thomas victorious on his hard-fought field.

As most of the corps of McCook and Crittenden had retreated to Chattanooga, it was deemed advisable also to withdraw the left wing to that place. Thomas consequently fell back during the night to Rossville, leaving the dead and most of the wounded in the hands of the enemy. He here received a supply of ammunition, and during all the 21st offered battle to the enemy, but the attack was not seriously renewed. On the night of the 21st he withdrew the remainder of the army within the defences of Chattanooga.

The enemy suffered severely in these battles, and on the night of the 20th was virtually defeated; but being permitted to gather the trophies of the field on the 21st, he is entitled to claim a victory, however barren in its results. His loss in killed, wounded and missing, as reported in rebel papers, was 18,000.

Our loss in these battles was 1,644 killed, 9,262 wounded, and 4,945 missing. If we add the loss of the cavalry, in its several engagements, at about 500, we have a total of 16,351. We lost, in material, 36 guns, 20 caissons, 8,450 small arms, and 5,834 infantry accoutrements. We captured 2,003 prisoners.

After General Rosecrans's retreat to Chattanooga, he withdrew his forces from the passes of Lookout mountain, which covered his line of supplies from Bridgeport. These were immediately occupied by the enemy, who also sent a cavalry force across the Tennessee above Chattanooga, which destroyed a large wagon train in the Sequatchie valley, captured McMinnville and other points on the railroad, thus almost completely cutting off the supplies of General Rosecrans's army. Fortunately for us, the line of railroad was well defended; and the enemy's cavalry being successfully attacked by Colonel McCook at Anderson's Cross Roads on the 2d of October, by General Mitchell at Shelbyville on the 6th, and by General Crook at Farmington on the 8th, were mostly captured or destroyed.

Major General Grant arrived at Louisville, and on the 19th, in obedience to the orders of the President, assumed general command of the departments of the Tennessee, Cumberland and Ohio. In accordance with his recommendation, Major General G. H. Thomas was placed in the immediate command of the department of the Cumberland, and Major General W. T. Sherman of that of the Tennessee.

As the supply of the army at Chattanooga demanded prompt attention, he immediately repaired to that place. By bringing up from Bridgeport the 11th and 12th corps, under General Hooker, and throwing a force from Chattanooga, under General W. F. Smith, on the south side of the river at Brown's Ferry, the points of Lookout mountain commanding the river were recaptured on the 27th, 28th and 29th of October. This important success restored his communications with his depots of supplies.

It is not my province, even if I had the means of doing so, to speak of the brilliant exploits of our navy in the western waters. It may be proper, however, to remark, that General Grant and his departmental commanders report that Admirals Farragut and Porter, and their officers, have rendered most valuable assistance in all their operations.

GENERAL REMARKS AND RECOMMENDATIONS.

It has not been possible, in the foregoing summary, to refer to all the engagements which our troops have had with the enemy during the past year, as no official accounts or reports of some of them could be found. The details given have been compiled from telegrams, despatches, and reports scattered through the various bureaus of the War Department. I respectfully recommend that all these official documents and reports, received since the beginning of the war, be collected and published, in chronological order, under the direction of the Adjutant General's department. Some have already been published by Congress, but they are so incorrectly printed and badly arranged, as to be almost useless as historical documents.

The rebel armies live mainly upon the country through which they pass, taking food and forage alike from friends and foes. This enables them to move with ease and great rapidity. Our commanders operating in the rebel States generally find no supplies, and in the border States it is difficult to distinguish between real friends and enemies. To live upon the country passed over often produces great distress among the inhabitants; but it is one of the unavoidable results of war, and is justified by the usages of civilized nations. Some of our commanders have availed themselves of this right of military appropriation, while others have required too large supply trains, and have not depended, as much as they might have done, upon the resources of the country in which they operated. General Grant says, in his official report:

"In the march from Bruinsburg to Vicksburg, covering a period of twenty days before supplies could be obtained from the government stores, only five days' rations were issued, and three of these were carried in the haversacks at the start, and were soon exhausted. All other subsistence was obtained from the country through which we passed. The march was commenced without wagons, except such as could be picked up through the country."

Instructions have been given to the generals operating in hostile territory to subsist their armies, so far as possible, upon the country, receipting and accounting for everything taken, so that all persons of proved loyalty may hereafter be remunerated for their losses. By this means our troops can move more rapidly and easily, and the enemy is deprived of supplies if he should re-occupy the country passed over by us. Some of our officers hesitate to fully carry out these measures from praiseworthy but mistaken notions of humanity, for what is spared by us is almost invariably taken by the rebel forces, who manifest very little regard for the suffering of their own people. In numerous cases, women and children have been fed by us to save them from actual starvation, while their fathers, husbands and brothers are fighting in the ranks of the rebel armies, or robbing and murdering in the ranks of guerilla bands.

Having once adopted the system of carrying nearly all our supplies with the army in the field—a system suited to countries where the mass of the population take no active part in the war—it is found very difficult to effect a radical change. Nevertheless, our trains have been very considerably reduced within the past year. A still greater reduction, however, will be required to enable our troops to move as lightly and rapidly as those of the enemy.

In this connexion I would respectfully call attention to the present system of army sutlers. There is no article legitimately supplied by sutlers to officers and soldiers which could not be furnished at a much less price by the quartermaster and commissary departments. Sutlers and their employés are now only partially subject to military authority and discipline, and it is not difficult for those who are so disposed to act the part of spies, informers, smugglers, and contraband traders. The entire abolition of the system would rid the army of the incumbrance of sutler-wagons on the march, and the nuisance of sutler-stalls and booths in camp; it would relieve officers and soldiers of much of their present expenses, and would improve the discipline and efficiency of the troops in many ways, and particularly by removing from camps the prolific evils of drunkenness.

I referred in my last report to the large numbers of officers and soldiers absent from their commands. It was estimated from official returns, in January last, that there were then absent from duty 8,987 officers, and 282,073 non-commissioned officers and privates. Only a part of these were really disabled or sick. The remainder were mostly deserters, stragglers, malingerers, and shirks, or men who absented themselves in order to avoid duty. Much of this evil has been abated. Very few furloughs are now given, and officers absent from duty not only lose their pay, but are subject to summary dismissal. Straggling and desertion have also greatly diminished, and might be almost entirely prevented if the punishment could be made prompt and certain. In this respect our military penal code requires revision. The machinery of courts-martial is too cumbrous for the trial of military offences in time of actual war. To organize such courts it is often necessary to detach a large number of officers from active duty in the field, and then a single case sometimes occupies a court for many months. To enforce discipline in the field, it is necessary that trial and punishment should promptly follow the offence.

In regard to our military organization, I respectfully recommend an increase of the Inspector General's department, and that it be merged in the Adjutant General's department.

The grades of commanders of armies and of army corps should be made to correspond to their actual commands. The creation of such grades need not cause any additional expense to government, as the pay and emoluments of generals and lieutenant generals could be made the same as now allowed to major generals commanding divisions.

I also respectfully call attention to our artillery organization. In the 5th regiment of United States artillery, each battery is allowed one captain, four lieutenants, eight sergeants, and twelve corporals; and all of these, together with the privates, receive cavalry pay and allowances. In the 1st, 2d, 3d, and 4th regiments of United States artillery, a battery is allowed one captain, three lieutenants, four sergeants, and four corporals, and, with the exception of two batteries to each regiment, for which special allowance was made by laws enacted on March 2, 1821, and March 3, 1847, all of these receive the pay and allowances of infantry; yet they are all, with the exception of four or five companies, performing precisely similar duties.

A field-battery of six guns absolutely requires all the officers and non-commissioned officers allowed in the 5th artillery, and the additional responsibility of the officers and labor of both officers and enlisted men render necessary the additional pay and allowances accorded by law to those grades in that regiment.

A simple remedy for these evils is the enactment of a law giving the 1st, 2d, 3d, and 4th regiments of United States artillery the same organization and same rates of pay as the 5th regiment; which, it may be added, is also the same as that already given to all the volunteer field batteries now in the United States service.

A similar discrepancy existed in the cavalry regiments till an act passed by the last Congress placed them all upon the same basis of organization and pay.

The act authorizing the President to call out additional volunteers, or drafted militia, limits the call to the cavalry, artillery, and infantry arms, and makes no provision for organizing volunteer *engineer* regiments. This was, unquestionably, a mere verbal omission in the law, and should be supplied, as it creates serious embarrassments in the organization of armies in the field. The generals commanding these armies complain in strong terms of the deficiency of engineer troops for the repair of railroads, the construction of pontoon bridges, and carrying on the operations of a siege, and urge that the evil be promptly remedied.

The waste and destruction of cavalry horses in our service has proved an evil of such magnitude as to require some immediate and efficient remedy. In the army of the Potomac there are thirty-six regiments of cavalry, averaging for the last six months from 10,000 to 14,000 men present for duty. The issues of cavalry horses to this army for the same period have been as follows:

In May	5, 673
June	6, 327
July	4, 716
August	5, 499
September	5, 827
October	7, 036
Total	35, 078

To this number should be added the horses captured from the enemy and taken from citizens, making altogether an average remount every two months. We have now in our service some 223 regiments of cavalry, which will require, at the same rate as the army of the Potomac, the issue, within the coming year, of 435,000 cavalry horses.

The organization of a Cavalry Bureau in the War Department, with frequent and thorough inspection, it was hoped would, in some degree, remedy these evils. To reach their source, however, further legislation may be necessary. Probably, the principal fault is in the treatment of their horses by the cavalry soldiers. Authority should, therefore, be given to dismount and transfer to the infantry service every man whose horse is, through his own fault or neglect, rendered unfit for service. The same rule might be applied to cavalry officers who fail to maintain the efficiency of their regiments and companies. The vacancies thus created could be filled by corresponding transfers from the regular and volunteer infantry.

By the existing law, the chief adjutant general, inspector general, quartermaster, and commissary of army corps, are allowed additional rank and pay, while no such allowance is made to the chiefs of engineers, artillery, and ordnance in the same corps. These latter officers hold the same relative position, and perform duties at least as important and arduous as the others, and the existing distinction is deemed unjust to them.

PRISONERS OF WAR.

On the 22d of July, 1862, Major General Dix and Major General Hill entered into a *cartel* for the exchange of prisoners during the existing war, specially stipulating when and where exchanges should be made and how declared, defining the meaning of a *parole*, and the rights and obligations of prisoners under parole, and when and how they were to be released from these obligations. Special agreements of this kind, modifying and explaining the general laws of war, furnish the rules of conduct for the contracting parties, in all cases for which they provide, or to which they are applicable.

Finding that the rebel authorities were paroling prisoners contrary to these stipulations, they were notified, on the 22d of May last, that all *paroles* not given in the manner prescribed by the cartel would be regarded as null and void. Nevertheless, they continued to extort, by threats and ill-treatment, from

our men, paroles unauthorized by the cartel, and also refused to deliver our offi-
prisoners and their officers. It is stated that they sold the former into slavery,
prisoners and their officers. It is stated that they sold the former into slavery,
and sentenced the latter to imprisonment and death, for alleged violation of local State laws. This compelled a resort to retaliatory measures, and an equal number of their prisoners in our hands were selected as hostages for the surrender of those retained by them. All exchanges under the cartel, therefore, ceased. In violation of general good faith and of engagements solemnly entered into, the rebel commissioner then proceeded to declare *exchanged* all his own paroled prisoners, and ordered their return to the ranks of their regiments then in the field. And we are now asked to confirm these acts, by opening new accounts and making new lists for exchange, and the rebels seek to enforce these demands by the most barbarous treatment of our officers and men now in their hands.

Rebel prisoners held by the United States have been uniformly treated with consideration and kindness. They have been furnished with all necessary clothing, and supplied with the same quality and amount of food as our own soldiers; while our soldiers, who, by the casualties of war, have been captured by them, have been stripped of their blankets, clothing, and shoes, even in the winter season, and then confined in damp and loathsome prisons, and only half fed on damaged provisions, or actually starved to death: while hundreds have terminated their existence, loaded with irons, in filthy prisons; not a few, after a semblance of trial by some military tribunal, have been actually murdered by their inhuman keepers. In fine, the treatment of our prisoners of war by the rebel authorities has been even more barbarous than that which Christian captives formerly suffered from the pirates of Tripoli, Tunis, and Algiers; and the horrors of "Belle Isle" and "Libby prison" exceed even those of "British hulks" or the "Black Hole of Calcutta." And this atrocious conduct is applauded by the people and commended by the public press of Richmond as "a means of reducing the Yankee ranks."

It has been proposed to retaliate upon the enemy by treating his prisoners precisely as he treats ours. Such retaliation is fully justified by the laws and usages of war, and the present case seems to call for the exercise of this extreme right. Nevertheless, it is revolting to our sense of humanity to be forced to so cruel an alternative. It is hoped self-interest, if not a sense of justice, may induce the rebels to abandon a course of conduct which must forever remain a burning disgrace to them and their cause.

CONCLUSION.

It is seen, from the foregoing summary of operations during the past year, that we have repelled every attempt of the enemy to invade the loyal States, and have rescued from his domination Kentucky and Tennessee, a portion of Alabama and Mississippi, and the greater part of Arkansas and Louisiana, and restored the free navigation of the Mississippi river.

Heretofore, the enemy has enjoyed great advantages over us in the character of his theatre of war. He has operated on short and safe interior lines, while circumstances have compelled us to occupy the circumference of a circle. But the problem is now changed. By the re-opening of the Mississippi river the rebel territory has been actually cut in twain, and we can strike the isolated fragments by operating on safer and more advantageous lines.

Although our victories since the beginning of the war may not have equalled the expectations of the more sanguine, we have every reason to be grateful to Divine Providence for the steady progress of our arms. In a little more than two years we have recaptured nearly every important point held by the rebels on the sea-coast, and we have re-conquered and now hold military possession of more than 250,000 square miles of territory held at one time by the rebel armies, and claimed by them as a constituent part of their confederacy. The extent of country thus recaptured and occupied by our armies is as large as France, or Austria, or the entire peninsula of Spain and Portugal, and twice as large as Great Britain, or Prussia, or Italy.

Considering what we have already accomplished, the present condition of the enemy, and the immense and still unimpaired military resources of the loyal States, we may reasonably hope, with the same measure of success as heretofore, to bring this rebellion to a speedy and final termination.

All of which is respectfully submitted.

H. W. HALLECK,
General-in-Chief.

Hon. E. M. STANTON, *Secretary of War.*

HEADQUARTERS OF THE ARMY,
Washington, December 6, 1863.

SIR: In compliance with your instructions, I submit the following summary of the operations of General Grant's army since my report of the 15th ultimo.

It appears, from the official reports which have been received here, that our loss in the operations of the 27th, 28th, and 29th of October, in reopening communications on the south side of the Tennessee river from Chattanooga to Bridgeport, was 76 killed, 339 wounded, and 22 missing; total, 437. The estimated loss of the enemy was over 1,500.

As soon as General Grant could get up his supplies, he prepared to advance upon the enemy, who had become weakened by the detachment of Longstreet's command against Knoxville.

General Sherman's army moved up the north side of the Tennessee river, and during the night of the 23d and 24th of November established ponton bridges, and crossed to the south side between Citico creek and the Chickamauga. On the afternoon of the 23d, General Thomas's forces attacked the enemy's rifle pits between Chattanooga and Citico creek. The battle was renewed on the 24th along the whole line; Sherman carried the eastern end of Missionary Ridge up to the tunnel, and Thomas repelled every attempt of the enemy to regain the position which he had lost at the centre, while Hooker's force in Lookout valley crossed the mountain and drove the enemy from its northern slope.

On the 25th, the whole of Missionary Ridge from Rossville to the Chickamauga was, after a desperate struggle, most gallantly carried by our troops, and the enemy completely routed. Considering the strength of the rebel position and the difficulty of storming his intrenchments, the battle of Chattanooga must be regarded as one of the most remarkable in history. Not only did the officers and men exhibit great skill and daring in their operations on the field, but the highest praise is also due to the commanding general for his admirable dispositions for dislodging the enemy from a position apparently impregnable. Moreover, by turning his right flank and throwing him back upon Ringgold and Dalton, Sherman's forces were interposed between Bragg and Longstreet, so as to prevent any possibility of their forming a junction.

Our loss in killed, wounded, and missing, is reported at about 4,000. We captured over 6,000 prisoners, besides the wounded left in our hands, 42 pieces of artillery, five or six thousand small arms, and a large train. The enemy's loss in killed and wounded is not known.

While Generals Thomas and Hooker pushed Bragg's army back into Georgia, General Sherman with his own and General Granger's forces was sent into East Tennessee to prevent the return of Longstreet and to relieve General Burnside, who was then besieged in Knoxville. We have reliable information that Sherman has successfully accomplished his object, and that Longstreet is in full retreat towards Virginia; but no details have been received in regard to Sherman's operations since he crossed the Hiwassee, nor of Burnside's defence of Knoxville. It is only known that every attack of the enemy on that place was successfully repulsed.

Very respectfully, your obedient servant,

H. W. HALLECK,
General-in-Chief.

Hon. E. M. STANTON, *Secretary of War.*

REPORT OF THE ADJUTANT GENERAL.

WAR DEPARTMENT, ADJUTANT GENERAL'S OFFICE,
Washington, December 3, 1863.

SIR: I have the honor to make the following report of this department:

During most of the past year the Adjutant General of the army has been employed, under special directions from the Secretary of War, in a responsible sphere of duties at the southwest. The character of business transacted in the Adjutant General's office was described in the last annual report. As was anticipated, it has increased in extent with the continuance of the war, and will still more increase. Two new branches have been added to the office—one by the establishment of a "bureau for colored troops;" and the other, an incident to the draft, for regulating the distribution of drafted men to regiments after they are delivered at the principal rendezvous by the provost marshals. Thus each new branch of the military service as it arises, although it may be immediately conducted under another department, adds proportionally to the labors of this office. But no pains will be spared fully and promptly to meet all the varied demands which may be made upon it.

Much solicitude is felt in regard to the reduced ranks of the regular army. Comparatively few recruits are now enlisted for it, partly because of the greater bounties paid to volunteers by States, counties, and associations; and partly owing to the term of service being five years instead of three. The official reports of battles have invariably spoken in high terms of the good conduct of the regulars whenever they have participated, and their thinned ranks after each encounter bear testimony that they are in nowise behind our gallant volunteers in steadiness and unyielding bravery under fire. It is earnestly recommended that such inducements as may be deemed effective and proper may be offered by Congress for enlistments in the regular regiments, and, among others, *that the term be fixed for three years* for all enlistments made during the present war. The 5th section, act approved July 29, 1861, establishing the term of three years, expired by limitation January 1, 1863.

Attention is respectfully asked to the 9th section, act approved July 17, 1862, regulating the pay of chaplains, in these words: "That hereafter the compensation of all chaplains in the regular or volunteer service or army hospitals shall be one hundred dollars per month and two rations per day when on duty." A strict construction of this act entirely deprives a chaplain of pay when not on duty; but it is supposed the intention of the law really was only to stop the two rations. Such intention would have been expressed so as to leave no doubt on the subject by a transposition of words as follows: "one hundred dollars per month; and, when on duty, two rations a day." Under the 31st section, act approved March 3, 1863, chaplains would then, like all other officers, receive half their pay when absent on leave for other cause than wounds or sickness, and full pay, without rations, when absent from those causes.

A serious evil arising from the absence of officers from duty has, in the past year, been in great part remedied. Two boards are in session—one at Annapolis, the other at Cincinnati—before one of which all officers who have left their commands in consequence of ill health are ordered to appear as soon as they are able to travel. They undergo an examination by the board and are recommended, according to their condition, for light duty, for further leave of absence, or for medical treatment in a general hospital of the city where the board is in session. But if found fit for duty, the president of the board orders them forthwith to their regiments. The reports of the board are a guide to the Adjutant General in making details for mustering, recruiting, or other light duty, and in recommendations for leave of absence, or discharge, where the nature of the disability requires. The reports of the boards, taken in connexion with regimental reports of absent officers, and the surgeons' certificates from such officers, form a complete system of accountability for absence from duty.

The officers of the Adjutant General's department are employed as follows:

One brigadier general, on special service organizing troops in the southwest.

One colonel, in charge of the Adjutant General's office, War Department.

One colonel and one major, major generals of volunteers.

One lieutenant colonel and four majors, on duty in the Adjutant General's office.

One lieutenant colonel, (brigadier general of volunteers,) adjutant general, army of the Potomac.

One lieutenant colonel and two majors, at headquarters of military departments.

One lieutenant colonel, (colonel,) Provost Marshal General.

One major, on duty in the office of the General-in-chief.

One major, brigadier general of volunteers.

Three majors, in Provost Marshal General's bureau.

One major, on duty with military governor of District of Columbia.

An assistant adjutant general of volunteers, with the rank of major, is in charge of the bureau for colored troops. His report is herewith submitted.

A captain of artillery, (additional aide-de-camp, with rank of major,) is also on duty in the Adjutant General's office.

Respectfully submitted.

E. D. TOWNSEND,
Assistant Adjutant General.

Hon. EDWIN M. STANTON, *Secretary of War.*

List of reports of battles received at the War Department since January 1, 1863, *and not heretofore printed.*

ARMY OF THE POTOMAC.

Forwarded by Major General Hooker:

Report of officers of the regular army of part taken by their commands at the battle of Chancellorsville. Received A. G. O. May 11, 1863.

Forwarded by Major General McClellan:

Report of the operations of the army of the Potomac while under his command, with sub-reports. Received A. G. O. August 7, 1863.

Fowarded by Major General Meade:

Report of the battle of Gettysburg. Received A. G. O. October 11, 1863.

DEPARTMENT OF THE TENNESSEE.

Forwarded by Major General U. S. Grant:

1. Report of operations before Vicksburg, December, 1862, with reports of Generals Sherman, McClernand, Morgan, Steele, and Smith, and Colonel Stewart. Received A. G. O. January 19, 1863.
2. Report of Major J. J. Mudd of the action of his command at Holly Springs, Mississippi. Received A. G. O. February 19, 1863.
3. Report of Colonel W. H. Morgan of action at Davis's Mills. Received A. G. O. February 19, 1863.
4. Report of General McClernand in regard to operations at Post Arkansas. Received A. G. O. February 24, 1863.
5. Report of General Burbridge of engagement at Greenville. Received A. G. O. March 19, 1863.

6. Report of Colonel Fuller of operations of his brigade in the battle of Parker's Cross-roads. Received A. G. O. March 27, 1863.
7. Report of Colonels Bryant and Grierson of their scout through Tennessee and Mississippi. Received A. G. O. May 13, 1863.
8. Report of General Dodge of expedition into Alabama. Received A. G. O. June 18, 1863.
9. Report of Brigadier General E. S. Dennis of the battle of Milliken's Bend. Received A. G. O. June 24, 1863.
10. Report of General Prentiss concerning attack made on Helena, Arkansas. Received A. G. O. July 28, 1863.
11. Report of operations before and capture of Vicksburg, with reports of Generals Sherman, McClernand, and McPherson; also, report of expedition from La Grange to Baton Rouge. Received A. G. O. August 1, 1863.
12. Report of Major General Herron of the Yazoo River expedition. Received A. G. O. August 12, 1863.
13. Report of General Sherman of his operations against General Johnston and evacuation of Jackson, Mississippi. Received A. G. O. September 1, 1863.

DEPARTMENT OF THE CUMBERLAND.

Forwarded by Major General W. S. Rosecrans:

1. Report of Generals Gilbert and Smith and Colonel Coburn of the battle of Thompson's Station Received A. G. O. March 9, 1863.
2. Report of Generals Granger and G. C. Smith of the battle of Little Harpeth. Received A. G. O. April 13, 1863.
3. Report of Colonel Straight of expedition to cut the Georgia railroad. Received A. G. O. May 15, 1863.
4. Report of operation of the army of the Cumberland from June 23 to July 4, 1863, with reports of corps commanders. Received A. G. O. July 30, 1863.
5. Report of General Rosecrans of the battle of Chickamauga, Tennessee, with reports of corps commanders, &c. Also, report of General J. S. Negley, explaining why he left the field of Chickamauga without orders. Received A. G. O. October 28, 1863.

Forwarded by Major General G. H. Thomas:

6. Reports of General Hooker, commanding eleventh and twelfth corps, and General Smith, chief of the engineer department of the Cumberland, of the battle of Wahatchie. Received A. G. O. November 23, 1863.
7. Reports of General R. B. Mitchell's pursuit of the rebel Wheeler in his raid to Middle Tennessee in October. Received A. G. O. December 5, 1863.

DEPARTMENT OF THE MISSOURI.

Forwarded by Major General R. S. Curtis:

1. Report of Generals Hovey and Steele of expedition into Mississippi. Received A. G. O. January 9, 1863.
2. Report of General Blunt of the battle of Prairie Grove, Arkansas. Received A. G. O. January 8, 1863.
3. Reports of General Blunt and Herron of battles of Crane Hill and Prairie Grove. Received A. G. O. January 19, 1863.
4. Report of Colonel Crabb of battle of Springfield, Missouri. Received A. G. O. January 23, 1863.

Forwarded by Major General J. M. Schofield:

5. Report of General Blunt of the battle of Honey Springs. Received A. G. O. August 17, 1863.
6. Report of the massacre of Lawrence, Kansas. Report of General Ewing herewith. Received A. G. O. September 1, 1863.
7. Reports of Generals Steele and Davidson of expedition into Arkansas and capture of Little Rock, Arkansas. Received A. G. O. October 1, 1863.
8. Report of General Blunt of the operations of his command against the rebels under Steele and Cabel. Received A. G. O. October 14, 1863.
9. Report of Colonel Clayton of gallant defence of Pine Bluff; also, Colonel Caldwell's report of the pursuit of Marmaduke, &c. Received A. G. O. November 24, 1863.

DEPARTMENT OF THE GULF.

Forwarded by Major General N. P. Banks:

1. Reports the result of his expedition and engagement before Centreville. Received A. G. O. April 23, 1863.
2. Reports engagement with rebels on Bayou Vermillion. Received A. G. O. April 29, 1863.
3. Reports attack on Port Hudson. Received A. G. O. June 8, 1863.
4. Reports operation of his command from May 21 to May 31 before Port Hudson. Received A. G. O. June 9, 1863.
5. Reports surrender of Port Hudson. Received A. G. O. July 25, 1863.
6. Reports operations of troops in his department. Also, reports of Generals Franklin and Weitzel of expedition to Sabine Pass. Received A. G. O. October 11, 1863.

DEPARTMENT OF WEST VIRGINIA.

Forwarded by Brigadier General B. F. Kelley:

1. Report of Captain Wallace of action with rebels at Greenland Gap. Received A. G. O. July 31, 1863.

DEPARTMENT OF THE SOUTH.

Forwarded by General Q. A. Gillmore:

1. Reports of the demolition of Fort Sumter. Received A. G. O. August 28, 1863.

DEPARTMENT OF THE SUSQUEHANNA.

Forwarded by General D. N. Couch:

1. Report of operations during the rebel invasion of Pennsylvania and Maryland. Report of Brigadier General W. F. Smith herewith. Received A. G. O. October 9, 1863.

DEPARTMENT OF THE NORTHWEST.

Forwarded by Major General John Pope:

1. Report of General A. Sully of expedition against the Sioux. Received A. G. O. October 20, 1863.

DEPARTMENT OF NORTH CAROLINA.

Forwarded by Major General J. N. Palmer:

1. Report of expedition under General Wistar. Received A. G. O. October 14, 1863.

DEPARTMENT OF THE MONONGAHELA.

Forwarded by Major General W. T. H. Brooks:

1. Report of the capture of General Morgan, rebel army. Received A. G. O. August 13, 1863.

E. D. TOWNSEND,
Assistant Adjutant General.

ADJUTANT GENERAL'S OFFICE,
Washington, December 5, 1863.

WAR DEPARTMENT, ADJUTANT GENERAL'S OFFICE,
Bureau for Colored Troops, Washington, D. C., October 31, 1863.

SIR: In obedience to your instructions, the following report of the operations of this bureau is respectfully submitted:

The bureau for colored troops was established by General Orders No. 143 current series, War Department, dated May 22, and a few days subsequent thereto the officer now in charge entered upon his duties, in compliance with orders from the Adjutant General of the army.

Under the authority of the War Department two colored regiments had already been raised in Massachusetts; in the State of North Carolina one regiment had been recruited by Brigadier General E. A. Wild, United States volunteers; in the State of South Carolina three small regiments had been organized by Brigadier General R. Saxton, United States volunteers; Hon. James H. Lane had recruited one regiment in Kansas; Brigadier General Ullman had left New York, and, taking with him the officers necessary for a brigade, had proceeded to the department of the Gulf, where, under the direction of the department commander, five regiments of infantry and two batteries of artillery have been organized; Brigadier General L. Thomas, adjutant general United States army, had organized, or put in process of organization, in the valley of the Mississippi, about twenty regiments, some of which have since rendered important service at Vicksburg and elsewhere.

Under these circumstances, the attention of the department was turned to the middle and eastern States. Colonel William Birney, second United States colored troops, then but recently appointed, was directed, on the thirteenth of June, 1863, to recruit and organize colored troops in this District. The first regiment, known as the first regiment United States colored troops, was recruited, mustered into service, put in a good state of drill and discipline, and ordered to the field within sixty days. The organization of a second regiment was immediately commenced, and is now recruited nearly to the maximum, and is known as the second regiment United States colored troops.

On the seventeenth of June, 1863, Major George L. Stearns was appointed recruiting commissioner for United States colored troops, and fixed his headquarters at Philadelphia, Pennsylvania, where a committee of patriotic citizens was engaged in raising colored troops, under authority issued by the department June 18, 1863. This committee commenced recruiting immediately, and on the fifth of August the organization of one regiment, known as the third regiment United States colored troops, had been completed, and the regiment ordered to Morris island, South Carolina, in time to take part in the operations against Forts Wagner and Sumter. The second regiment organized at Philadelphia, known as the sixth regiment United States colored troops, left that city on the eighth day of October, and another regiment, known as the eighth, is nearly full. To the committee above named, and other citizens of the middle and eastern States, who have given freely of their time and money to advance this work, the department is largely indebted for very valuable assistance.

On the sixth of July, 1863, Major General R. C. Schenck was authorized to commence recruiting for this branch of the service in Maryland. A recruiting station was established in Baltimore, under the superintendence of Colonel Birney, about the middle of the same month, and a regiment, known as the fourth regiment United States colored troops, was recruited and organized in less than seven weeks, and on the twenty-fifth of September was under marching orders. The organization of another regiment, known as the seventh regiment United States colored troops, was immediately commenced, and has now attained nearly the maximum number.

Nearly simultaneously with the commencement of operations in Pennsylvania and Maryland, the governors of Ohio and Rhode Island were each authorized to raise one regiment; the former a regiment of infantry, and the latter a regiment of artillery. The Ohio regiment, known as the fifth regiment United States colored troops, has now nine full companies, while the Rhode Island regiment, known as the fourteenth regiment Rhode Island heavy artillery, has nine hundred men, about half the maximum number for an artillery regiment.

On the twenty-second of July Major General James G. Blunt was authorized to raise one regiment in Kansas; this regiment is now full, and Major General Blunt has been authorized to raise another, which will be known as the eleventh regiment United States colored troops.

The governor of Michigan was authorized, on the twenty-fifth of July, 1863, to raise one regiment of infantry; for this regiment three full companies have been recruited.

In addition to the foregoing, authority to raise colored troops has been issued as follows, viz:

The governor of Delaware, one regiment of infantry, June 24, 1863; the governor of Iowa, one regiment of infantry, July 27, 1863; the governor of Wisconsin, one regiment of infantry, July 31, 1863; the governor of Illinois, one regiment of infantry, September 25, 1863; Brigadier General Thomas Ewing, jr., one regiment of infantry in eastern Kansas, August 8, 1863; Major General J. G. Foster, one regiment of infantry, September 30, 1863.

No material progress in raising the above regiments has yet been reported.

While the operations above recited have been in progress in the northwestern, western, middle and eastern States, one additional regiment has been raised in each of the Carolinas, and sixteen regiments have been added to the four previously raised in Louisiana, while Brigadier General L. Thomas, adjutant general United States army, has been vigorously at work in the valley of the Mississippi from Iowa to the Gulf of Mexico. Of the operations of General Thomas it is not necessary or proper that I should speak, his reports being forwarded directly to the Secretary of War, under whose immediate instructions he is acting.

Classifying the troops by States, the following statement presents a brief outline of the work accomplished to this date:

Massachusetts, two regiments of infantry	2, 000
Rhode Island, one regiment artillery (incomplete)	900
Pennsylvania, three regiments infantry, (one incomplete)	2, 500
Maryland, two regiments infantry, (one incomplete)	1, 800
North Carolina, two regiments infantry, (muster-in rolls of second regiment not received, but known to be full)	2, 000
South Carolina, four regiments infantry, (one very small)	1, 700
Alabama, three regiments, (two of infantry and one of artillery, all incomplete)	1, 295

Mississippi, five regiments, (four of infantry and one of artillery, all incomplete)	2, 886
Louisiana, twenty-one, (eighteen of infantry, one of artillery, and two of engineers)	12, 631
Arkansas, three regiments infantry, (incomplete)	1, 790
Tennessee, five regiments, (three of infantry and two of artillery)	3, 955
Kansas, two regiments infantry	1, 600
Ohio, one regiment infantry, (nine companies)	800
Iowa, one regiment infantry, (incomplete)	600
Michigan, one regiment infantry, (three companies)	250
District of Columbia, two regiments infantry	2, 000
Total	38, 707

RECAPITULATION.

Two regiments engineers	1, 382
Six regiments artillery	3, 716
Fifty regiments infantry	33, 609
Total	38, 707

Please see tabular statement appended to this report giving the designation of each regiment, the names of commanding officers, and the strength of each regiment as shown by the latest returns on file in the Adjutant General's office.

It will be observed that the foregoing figures disagree somewhat with the statement hereunto attached. This arises from the fact that muster-in rolls of troops known to have been mustered have not been received, and that I have, as far as possible, given credit to States for troops known to have been mustered in. The statement herewith gives their numbers as they now stand, after some months' service in the field, in which they have in some instances been much reduced by disease and losses in battle.

The examining boards instituted in connexion with this branch of the service, for the examination of candidates for appointment, present too important a feature to be passed over without remark. Three boards are now in session—one in this city, of which Major General Silas Casey, United States volunteers, is president; one at Cincinnati, Ohio, of which Colonel Henry Van Rensselaer is president; and a third at Saint Louis, Missouri, of which Colonel Daniel Huston, 7th Missouri cavalry, is president. Fifteen hundred and thirty-four persons have been authorized to appear for examination. Of this number, nine hundred and eighteen have been examined. Five hundred and seventeen are reported qualified for command, as follows, viz:

Qualified for colonels	13
Qualified for lieutenant colonels	12
Qualified for majors	36
Qualified for captains	98
Qualified for first lieutenants	137
Qualified for second lieutenants	221
Total	517

Four hundred and one have been rejected by the boards on account of mental or physical disqualifications. Of the number favorably reported by the boards, three hundred and twenty-three have been appointed; the appointments being confined, with few exceptions, to those regiments designated as "United States colored troops" in the tabular statement appended hereto.

It is possible that some meritorious candidates have been rejected by the boards, but the examinations have without doubt been conducted impartially, and have resulted in giving to this branch of the service a class of efficient and well-instructed officers.

The colored troops have already established for themselves a commendable reputation. Their conduct in camp, on the march, in siege, and in battle, attests their discipline, their endurance, and their valor.

Soon after entering upon my duties in connexion with this bureau, there was transferred to me, by your order, the sum of ten thousand dollars from the fund for "collecting, drilling, and organizing volunteers." Nine thousand dollars of this amount have been transferred to Major George L. Stearns, acting adjutant general volunteers and recruiting commissioner for colored troops, and the remainder to his excellency the governor of Ohio, to be expended in accordance with the law making the appropriation.

My accounts, with the necessary vouchers, have been duly rendered to the proper officers of the Treasury Department and Provost Marshal General's bureau.

I have the honor to be, very respectfully, your obedient servant,

C. W. FOSTER,
Assistant Adjutant General Volunteers.

Hon. E. M. STANTON,
Secretary of War, War Department, Washington, D. C.

Statement of colored troops in the service of the United States, October 31, 1863, *compiled from the latest official reports.*

No. of Regiment.	Designation.	Commanding officer.	Strength.
1	1st United States colored troops.	Colonel John H. Holman......	990
2	2d.......... .....do............	Lieut. Colonel Stark Fellows...	800
3	3d.. ....do............	Colonel B. C. Tilghman.......	775
4	4th.... ......do............	Colonel S. A. Duncan.........	1,002
5	5th.......... ....do............	Colonel Lewis McCoy	750
6	6th.... ....do............	Colonel John W. Ames	950
7	7th.......... ....do............	Colonel James Shaw, jr.	700
8	8th.... ......do............	....	500
9	1st Tennessee volunteers, A. D..	Colonel E. Bonton............	815
10	2d........ .....do............	Lieut. Colonel John Foley.....	610
11	3d.. ....do............	Colonel C. H. Thompson	976
12	1st Tenn. heavy artillery, A. D.	Colonel J. G. Kappner.........	960
13	2d.. ....do............	Colonel C. H. Adams..........	594
14	1st Arkansas volunteers, A. D..	Colonel W. F. Wood	663
15	2d.. .. .. do............	Colonel S. S. Sheely..........	334
16	3d.......... .. do............	Colonel Guyler	783
17	1st Kansas volunteers, A. D....	Colonel J. M. Williams	761
18	2d.. .... do............	Colonel S. J. Crawford........	870
19	1st N. Carolina volunteers, A. D.	Colonel J. C. Beecher.........	1,002
20	2d ....do............	Colonel A. G. Draper.........	800
21	3d ....do............	....	......

Statement of colored troops in the service of the United States—Continued.

No. of Regiment.	Designation.	Commanding officer.	Strength.
22	1st S. Carolina volunteers, A. D.	Colonel T. W. Higginson......	662
23	2d ....do............	Colonel James Montgomery....	562
24	3d ....do............	Colonel A. G. Bennett........	370
25	4th..........do............	Colonel M. S. Littlefield.......	100
26	1st Alabama volunteers, A. D...	Colonel James M. Alexander...	890
27	2d ....do...........	....	80
28	1st Alabama heavy artillery, A.D.	....	325
29	1st Mississippi volunteers, A. D.	Colonel J. F. Shephard	505
30	2d..........do............	Colonel G. M Zeigler..........	455
31	3d ....do............	Colonel R. H. Ballinger	551
32	6th..........do............	Colonel A. S. Smith	860
33	2d Miss. heavy artillery, A. D..	Colonel B. G. Farrar..........	515
34	1st Louisiana engineers, A. D...	Colonel Justin Hodge.........	847
35	2d ....do............	Colonel John E. Cobb........	535
36	1st Louisiana native guards, A. D.	Colonel S. H. Stafford	1,025
37	2d ....do............	....	612
38	3d ....do............	Lieut. Colonel H. Finegrass....	981
39	4th..........do............	Colonel C. H. Drew	887
40	8th Louisiana volunteers, A. D..	Colonel H. Schofield..........	696
41	9th..........do............	Colonel H. Lieb..............	893
42	10th..........do............	Colonel F. M. Crandal........	803
43	11th..........do............	Colonel E. W. Chamberlain....	595
44	12th..........do............	Colonel C. A. Gilchrist........	670
45	20th regiment corps d'Afrique..	Lieut. Colonel A. E. Buck.....	211
46	3d..........do............	Major Langdon Ward.........	582
47	6th..........do............	Colonel A. B. Botteford	442
48	7th..........do............	Lieut. Colonel James C. Clark..	357
49	8th..........do............	Colonel Cyrus Hamlin	390
50	9th..........do............	Colonel John F. Appleton.....	351
51	10th..........do............	Lieut. Colonel L. L. Zulaoski...	606
52	11th..........do............	Major J. Hutchings	420
53	12th..........do............	Lieutenant Dickey..........	412
54	1st Louisiana heavy art'y, A. D.	....	422
55	54th Mass. volunteers, A. D....	Colonel Robert C. Shaw.......	830
56	55th..........do............	Colonel N. P. Hallowell	993
57	14th R. I. heavy artillery, A. D.	Colonel Nelson Vial..........	900
58	1st Iowa volunteers, A. D......	....	500

Recapitulation.—Fifiy-eight regiments; total strength, 37,482.

Respectfully submitted.

C. W. FOSTER,
Assistant Adjutant General of Volunteers.

REPORT OF THE QUARTERMASTER GENERAL.

QUARTERMASTER GENERAL'S OFFICE,
Washington, December 4, 1863.

SIR: I have the honor to submit the usual annual report of the operations of the quartermaster's department during the fiscal year ending June 30, 1863.

I have the honor to be, very respectfully, your obedient servant,

CHS. THOMAS, *Colonel,*
Acting Quartermaster General.

On the 30th of June, 1862, the termination of the preceding fiscal year, the balances in the hands of officers acting in this department (after deducting the disbursements ascertained from accounts which had passed the required administrative examination of this office) amounted, as stated in the last annual report, to		$131,591,956 60
To which are to be added:		
1st. Remittances first quarter of the fiscal year	$48,042,199 84	
Remittances second quarter of the fiscal year	66,378,281 08	
Remittances third quarter of the fiscal year	65,764,052 57	
Remittances fourth quarter of the fiscal year	62,315,987 00	
		242,500,520 49
2d. Proceeds of sales of property, rents of buildings, &c.		1,003,805 18
Total amount to be accounted for		375,096,282 27
From which are to be deducted the disbursements by officers, ascertained from accounts which have passed the required administrative examination of this office, viz:		
Prior to the fiscal year the accounts which had not passed the required administrative examination in time for the last annual report, viz:	$105,776,782 15	
In the first quarter of the fiscal year	8,553,390 66	
In the second quarter of the fiscal year	3,124,369 67	
In the third quarter of the fiscal year	588,074 79	
In the fourth quarter of the fiscal year	420,694 76	
		118,463,312 03
Balance due June 30, 1863, after deducting the amount of disbursements ascertained from accounts which have passed the required administrative examination		256,632,970 24
From which there is to be made a further deduction of the amount of disbursements, as ascertained from accounts for periods prior to and in the fiscal year ending June 30, 1863, which have been received and registered, but of which the required administrative examination has not been made, viz:		
Prior to the fiscal year	$14,460,388 14	
In the first quarter	17,356,069 88	
In the second quarter	53,336,583 84	

In the third quarter	$54,034,182 58	
In the fourth quarter	54,102,022 58	
	193,289,247 14	
Less amount shown to have been received from sales of property, rent of buildings, &c.	4,193,824 75	
		$189,095,422 39
Leaving an outstanding balance due June 30, 1863, of		67,537,547 85

Which is made up as follows, viz:

1st. Amount of requisitions drawn in favor of officers, the accounts for disbursements of which have not been received at this office	$46,537,380 43

Of this amount, two million three hundred and forty-nine thousand one hundred and ninety-two dollars and thirty-three cents was drawn in the fiscal year ending June 30, 1862.

The balance, forty-four million one hundred and eighty-eight thousand one hundred and eighty-eight dollars and ten cents, was drawn in the fiscal year ending June 30, 1863, and should have been accounted for as follows, viz:

In the first quarter	$1,744,778 10
In the second quarter	9,173,090 00
In the third quarter	15,724,713 00
In the fourth quarter	17,545,607 00
	44,188,188 10

A large portion of this, although remitted during the fiscal year, could not have been received before its termination, and will be accounted for hereafter. The greater portion has doubtless been accounted for direct to the proper accounting officer of the Treasury Department, as required by the act of Congress approved July 17, 1862.

2d. Amount in the hands of officers unaccounted for (as ascertained from balances found due the government, upon examination of the last accounts received, and from receipts for advances made to officers for disbursement) by officers whose accounts have been rendered	6,571,300 49

Of this amount the sum of two million seven hundred and thirty-five thousand three hundred and thirty-eight dollars and five cents was due prior to and in the fiscal year ending June 30, 1862.

The balance, three million eight hundred and thirty-five thousand nine hundred and sixty-two dollars and forty-four cents, was due in the fiscal year ending June 30, 1863, and should have been accounted for as follows, viz:

In the first quarter	$668,625 15
In the second quarter	434,763 58
In the third quarter	807,383 34
In the fourth quarter	1,925,190 44
	3,835,962 44

The greater portion of this has probably been accounted for direct to the proper accounting officer of the Treasury Department, as required by the act of Congress before referred to.

3d. The remainder is distributed among the officers disbursing at the various posts and stations and in the field, and is applicable to the payment of debts contracted during the year, by which it will undoubtedly be absorbed. It is	$14,428,866 93
Total balance as before	67,537,547 85

The amount paid during the fiscal year ending June 30, 1863, (including those for purchases made and services rendered in the preceding fiscal year, and not included in the last annual report,) as ascertained from the accounts which have passed the required administrative examination of this office, were, viz:

1. For regular supplies, viz:		
Fuel	$1,217,802 39	
Forage	9,033,015 90	
Straw	87,373 24	
Stationery	208,764 59	
		$10,546,957 12
2. For incidental expenses of the army:		
Postage	78,576 80	
Expenses of courts-martial	33,906 12	
Expresses and escorts	31,692 95	
Burial expenses	87,272 75	
Guides, interpreters, and spies	90,597 05	
Clerks and agents	574,595 63	
Pay of wagon and forage master	7,605 18	
Laborers	810,683 55	
Soldiers on constant labor	560,756 60	
Hire of veterinary surgeons	16,631 58	
Office furniture	40,218 29	
Medicine for horses and other animals	39,292 39	
Forges, blacksmiths' and shoeing tools	90,919 10	
Horse and mule shoes and nails, and iron and steel for shoeing	286,191 38	
Picket rope	5,804 70	
Apprehension of deserters	28,617 47	
		2,783,361 54
3. Cavalry and artillery horses		3,958,530 32
4. Transportation and supply of prisoners, &c		95,836 47
5. Telegraph for military purposes, and expenses of operating same		253,198 33
6. Barracks and quarters, viz:		
For rent	$576,965 82	
For construction and repairs	1,782,799 84	
		2,359,765 66
7. Mileage, transportation of officers and baggage		203,428 32

8. Transportation, viz:		
Of clothing	$204,589 35	
Of subsistence	948,287 32	
Of ordnance	597,567 53	
Of troops and supplies	38,861,011 15	
		$40,611,455 35
9. Purchase of stoves		90,522 78
10. For materials for, and amount expended in, the purchase and preparation of clothing, camp and garrison equipage		55,887,505 58
11. Collecting, drilling, and organizing volunteers		77,692 30
12. For the construction and maintenance of the gunboat fleet proper		660,811 73
13. For the purchase, construction, and maintenance of steam rams		314,448 74
14. Special expenditures for other departments, and under special appropriations, viz:		
For medical department	$303,448 60	
For ordnance department	96,148 69	
For pay department	881 25	
For subsistence department	10,441 66	
For engineer department	2,278 13	
For Adjutant General's department	16,277 76	
For constructing stables at Carlisle barracks	161 59	
For army contingencies	96,097 95	
		525,735 63
		118,469,249 87
Less amount of errors, &c., ascertained in officers' accounts,		5,937 84
Total		118,463,312 03

From the above statement it will be seen that but a small number of the accounts for disbursement by officers of this department during the fiscal year ending June 30, 1863, have at this date passed the official examination required by law prior to transmission to the treasury for final examination and settlement. Four thousand eight hundred and eighty-four accounts remain on hand to be examined, containing disbursements amounting to $193,289,247 14, of which number thirty-five pertain to periods prior, and four thousand eight hundred and forty-nine to the fiscal year ending June 30, 1863; add to which the number yet due and to be received, the number of accounts unexamined for the fiscal year ending June 30, 1863, will not fall far short of six thousand.

Since the last annual report two thousand three hundred and forty-two accounts, containing disbursements amounting to $118,463,312 03, have been examined and sent to the treasury for final settlement, of which number one thousand three hundred and fifty-eight pertained to the fiscal year ending June 30, 1862, and nine hundred and eighty-four to the fiscal year ending June 30, 1863.

The number of officers making returns to this office is very large. During the fiscal year ending June 30, 1863, they numbered four thousand one hundred and seventy-eight, eighteen hundred and two being disbursing officers, and the remainder, two thousand three hundred and seventy-six, regimental and acting assistant quartermasters, who were accountable for property only. Among the former are comprised the quartermasters and assistant quartermasters of the regular and volunteer army, who are acting as chief disbursing officers to armies, corps, divisions, and brigades in the field, or in charge of the important depots for the purchase and manufacture of supplies. Many of them are charged with the expenditure of large sums of money, and their accounts are necessarily very voluminous.

These officers were also accountable for clothing, camp and garrison equipage, received and issued, and are required to render monthly returns for the same to this office.

In addition to this, every officer commanding a company in the regular or volunteer army is required to account monthly for all clothing received by him for issue, as well as for all quartermasters' stores for which he may be responsible. These returns are registered and examined prior to transmission to the treasury for final settlement.

Five thousand eight hundred and thirty-three accounts for disbursement of money, and fifteen thousand one hundred and six for property received and issued, have been received in the quartermaster's department proper during the fiscal year ending June 30, 1863.

In an army of one million men there will be not less than ten thousand company commanders, from whom there should be one hundred and twenty thousand returns received during the year.

The correspondence with the officers who fail to render their returns within the time required by the regulations, as well as with those whose returns are incorrect or imperfect, involves much labor. Officers appointed in the quartermaster's department too frequently do not attach sufficient importance to the office. They are in many instances entirely unacquainted with its duties, and, from their previous occupations, unqualified to perform them. None but good accountants and persons who have been engaged in business of a mercantile character, or who have had experience as regimental quartermasters and proved their fitness for the office, should be appointed assistant quartermasters.

The regimental quartermasters, who are necessarily intrusted with a large amount of property, are, in some cases, not only unacquainted with their duties, but appear to be appointed without reference to their business qualifications, and are frequently changed—for what reason is unknown to this office. I recommend that they be required to give bonds for the faithful performance of their duties in a sufficient amount to secure the government from loss. I also recommend that commanders of regiments who appoint them be accountable for all public funds or property which may come into their hands until their appointments are approved by the Secretary of War, and good and sufficient bonds given for the faithful performance of their duties.

The object of this department is to insure an efficient system of supply, and to give facility and effect to the movements and operations of the army. It is the duty of this department to provide quarters, hospitals, and transportation for the army, and prisoners of war, and transportation for all military stores, provisions, camp and garrison equipage, ordnance and ordnance stores; to direct the survey and superintend the opening and repairing of roads, and the construction and repairs of bridges which may be necessary to the movements of any part of the army, or as communications between the posts on the frontier and between those posts and the interior; to provide good and sufficient storehouses for all military supplies; to provide materials and direct and superintend the constructing and repairing of quarters, barracks, hospitals, storehouses, stables, and other necessary buildings for the accommodation of the army and the security of public property; to purchase all fuel forage, straw, and stationery required for the army, and have them transported to the posts where they may be wanted, and issued to those entitled to them; to purchase all horses, oxen, mules, and harness, and all wagons, carts, boats, and other vessels, with their equipments, for the transportation of the army and for garrison purposes; to have the custody of the same, and be responsible for their proper use; to purchase all cavalry and artillery horses; to construct, repair, and maintain all telegraph lines necessary for military purposes, and to provide for the maintenance of the steam-ram fleet on the western rivers. The duty of constructing and maintaining the gunboat fleet on the western rivers, for which it has been hitherto the duty of this department to provide, has been transferred to the Navy Department.

It is no less a duty to examine promptly the accounts received, so that officers may be timely advised of the defects existing, and an opportunity afforded them to render such explanations as may be necessary while the subject is fresh in their memory.

The clerical force of this office is still insufficient to examine the accounts with that promptness which their importance demands and the interest of the service requires. The additional force authorized by the act of Congress approved February 7, 1863, was not appointed for a considerable time after the passage of the act, Congress having failed to make any appropriation for the payment thereof. When the appointments were made, the current business of the office had accumulated to such a degree as to demand a large proportion of the force authorized, leaving the number to be assigned to the administrative examination of accounts much less than was anticipated. That progress has not, therefore, been made in the examination of accounts which was expected. A great obstacle to more rapid progress has existed in the time occupied in imparting such instruction to new appointees as was necessary to make their services available. Another still greater obstacle was the great amount of labor necessary to be performed in the correction of informalities and defects, required to be remedied before the usual administrative examination could be made.

It is believed that these obstacles have in a great measure been overcome; but in order to bring up the large amount of work that has accumulated, and will continue so to do, and to settle the accounts promptly hereafter, as well as to keep up the correspondence incidental to the same, it is believed that an additional force of one hundred and sixty clerks will be required, of which I respectfully recommend the following classification, viz: Seventy of class *one;* sixty of class *two;* and thirty of class *three.* This will make the classification properly proportionate to the whole number employed in the office, and will have a salutary effect in increasing the efficiency of the clerical force. Six additional laborers or messengers are also required.

The additional force authorized by the act approved February 7, 1863, consisted of ninety clerks of the first class, or lowest; no second or third class; and four clerks of the fourth, or highest class; and thirty lady copyists. The want of intermediate grades has operated very injuriously. Many of the most efficient clerks, to whom higher positions have been tendered elsewhere, have resigned, and the office has been deprived of their services at the time when they were not only most valuable, but really indispensable.

Clerks who have been employed one or two years, and have become proficient in their duties, naturally look for promotion.

I also recommend, in view of the largely increased cost of living in this city, that the sum of two hundred dollars be added to the pay now allowed to each class, the increased pay to commence ——— ———, and to continue for so long a time as there may be a necessity therefor.

The additional clerical force asked for, with a sufficient number of officers thoroughly acquainted with the laws and regulations of the army, will, it is believed, enable this department to despatch the business relative to the settlement of accounts with that promptness required alike by justice to the interest of the government and of the officers of this department.

The rooms assigned to this office in the "Winder Building" not affording sufficient accommodation for the clerks and records, it was found necessary to rent additional buildings elsewhere. Several have been obtained; but they are inconvenient, insecure, and generally contracted, and do not afford such accommodations as are deemed requisite for the proper transaction of the public business. The loss of valuable time in communicating from one branch of the office to the other, and the inconvenience occasioned by the separation of branches that should be contiguous to each other, is very great. The building being fitted up by your authority will, it is thought, be sufficient to accommodate all the clerks at present employed, as well as the additional force applied for, except probably those employed in the clothing branch, who are now very well provided for in a building by themselves.

By the law of July 17, 1862, to provide for the more prompt settlement of accounts of disbursing officers, all such officers are required to transmit their money accounts monthly, direct to the proper accounting officer of the treasury. This is now done, and, after a cursory examination by the Auditor, they are referred to this office for an examination.

The Quartermaster General is enabled by this method to give them that rigid administrative scrutiny which is required by the army regulations; to charge the disbursements against the appropriations to which they pertain; to advise the Auditor of such additional facts as are necessary to facilitate the final settlement of the accounts at the treasury; and to inform the officer, in advance, of such defects as require to be remedied before a final settlement can be made. After this examination the accounts are returned to the Auditor for final examination and settlement.

The property returns are transmitted direct to this office, and, after a rigid examination, forwarded to the proper Auditor of the treasury for final settlement as heretofore. I consider the system a good one, and advise its continuance.

TRANSPORTATION.

Of the means of transportation, there were on hand at the beginning of the fiscal year, July 1, 1862, 14,842 horses; 16,899 mules; 1,727 oxen; 4,645 army wagons; 551 ambulances; 149 light wagons; 39,366 wheel and lead harness. There were purchased during the year, 174,832 horses; 86,254 mules; 60 oxen; 12,730 army wagons; 3,511 ambulances; 77 light wagons; 111,978 wheel and lead harness. There were captured during the year, 7,783 horses; 6,915 mules; 223 oxen; 421 army wagons; 104 ambulances; 50 light wagons; 3,013 wheel and lead harness. In all, amounting to 197,457 horses; 110,068 mules; 2,010 oxen; 17,796 army wagons; 4,166 ambulances; 276 light wagons; 154,357 wheel and lead harness.

There were condemned and sold, died, lost by capture, destroyed, worn out, &c., during the year, 57,576 horses; 17,170 mules; 1,486 oxen; 816 army wagons; 232 ambulances; 41 light wagons, and 11,825 wheel and lead harness.

There were on hand at the end of the fiscal year, 45,755 horses; 46,226 mules; 1,276 oxen; 10,729 army wagons; 1,805 ambulances; 1,263 light wagons, and 98,817 wheel and lead harness.

Of forage, there were on hand at the beginning of the fiscal year, July 1, 1862, 22,046,951 pounds oats; 37,417,934 pounds corn; 22,294,697 pounds hay and fodder; 17,250 pounds mixed grain. There were purchased during the year, 340,906,893 pounds oats; 283,940,284 pounds corn; 578,113,890 pounds hay and fodder; 95,437,787 pounds mixed grain. There were captured, gained in issuing, &c., during the year, 10,394,402 pounds oats; 14,453,870 pounds corn; 28,764,537 pounds hay and fodder; 374,769 pounds mixed grain. In all, amounting to 373,348,246 pounds oats; 335,812,088 pounds corn; 629,173,124 pounds hay and fodder, and 95,829,799 pounds mixed grain.

There have been sold, lost by capture, destroyed, expended, &c., during the year, 15,550,268 pounds oats; 33,851,736 pounds corn; 25,152,583 pounds hay and fodder, and 28,172 pounds mixed grain.

The amounts remaining on hand at the end of the fiscal year are, 44,495,564 pounds oats; 38,907,116 pounds corn; 30,960,467 pounds hay and fodder, and 21,936,338 pounds mixed grain.

Of coal, there were on hand at the beginning of the fiscal year, July 1, 1862, 914½ tons. There were purchased during the fiscal year, 130,820$\frac{9}{20}$ tons. There were captured, &c., during the fiscal year, 15,477$\frac{5}{12}$ tons. Amounting to 147,212$\frac{22}{60}$ tons.

There have been sold, lost, and expended during the year, 82,779$\frac{1}{12}$ tons; and remaining on hand at end of the fiscal year, 11,821½ tons.

Of public funds, there were on hand at the beginning of the fiscal year, July 1, 1862, $5,201,300 12. There were received from sales of property, &c., during the fiscal year, $1,541,397 50. There have been disbursed during the fiscal year, $212,112,064 65; and the balance on hand at the end of the fiscal year, was $14,555,004 80.

The following articles were purchased during the time from July 1, 1863, to September 30, 1863: 43,927 horses; 6,899 mules; 4 oxen; 1,262 army wagons; 160 light wagons; 40 ambulances; 4,597 wheel harness, and 6,000 lead harness. There were captured during the same time, 5,604 horses; 2,398 mules; 31 oxen; 208 army wagons; 61 ambulances; 1,103 wheel harness, and 1,533 lead harness. In all, amounting to 49,531 horses; 9,297 mules; 35 oxen; 1,470 army wagons; 160 light wagons; 101 ambulances; 5,700 wheel harness, and 7,533 lead harness.

There were sold, lost by capture and death, destroyed, &c., during the same time, 17,989 horses; 5,582 mules, and 101 oxen.

The amount of transportation furnished during the fiscal year is as follows:

Of subsistence stores by land, 784,833 barrels and kegs; 17,654 cattle; 146,594½ tons. Of subsistence stores by water, 4,478,143 barrels and kegs; 102,914 cattle; 174,217$\frac{1}{6}$ tons.

Of ordnance stores by land, 354,659 barrels and kegs; 883 guns, &c.; 2,776$\frac{11}{20}$ tons. Of ordnance stores by water, 386,756 barrels and kegs; 1,093 uns, &c.; 78,088$\frac{11}{12}$ tons.

Of quartermaster stores by land, 430,666 barrels and packages; 126,584 imals; 39,354 tons forage, fuel, &c., and 437,354$\frac{4}{5}$ tons. Of quartermaster res by water, 753,569 barrels and packages; 109,009 animals; 88,438 tons forage, fuel, &c., and 753,144$\frac{3}{20}$ tons.

There were 1,264,602 troops transported during the year by land, and 567,397 ps transported during the year by water.

he amounts paid for the above transportation were—by land, $8,030,003 03; akes and rivers, $9,476,681 73; and by ocean, $4,798,385 02.

mong the numerous miscellaneous articles purchased during the fiscal year, ollowing are reported: 214,718 cords wood; 6 steam vessels; 64 locomo- ; 899 freight cars; 196 medicine wagons; 39,412,889 feet lumber; 56½ and bricks; 1,436,566 pounds nails; 18,211 chains; 922½ tons iron; ,530 horseshoes; 236,288 pounds horseshoe nails; 414,700 pounds leather; 44 pounds rope; 17,969 saddle blankets; 4,273 pack-saddles; 235,497 covers.

re have been employed in the quartermaster's department during the fiscal 2 ships; 42 brigs; 46 barges; 554 schooners; 4 sloops; 72 propellers; m-tugs; 12 ferry-boats; 13 tow-boats; 649 barges, and 1,222 steamers. earnings of which there has been paid the amount of $17,788,043 53.

foregoing are but approximations, based upon the reports received, as e a number of officers of the department who have not responded to order No. 13 of the Quartermaster General, calling for reports for the r; consequently a full exhibit cannot at this time be made.

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Your attention is respectfully invited to the reports of Brigadier General D. H. Rucker, chief quartermaster, depot of Washington; Colonel Elias M. Greene, chief quartermaster, department of Washington; Colonel D. C. McCallum, military director and superintendent of United States railroads; Colonel Anson Stager, assistant quartermaster and general superintendent of United States military telegraph; Colonel Lewis B. Parsons, assistant quartermaster and chief of transportation, department of Missouri, as well as to those of other officers charged with extra and important duties, as containing much valuable information.

In submitting this report, during the absence of the Quartermaster General of the army, I have endeavored to confine myself to those subjects immediately connected with the duties of the office and of the officers of the department, leaving to be submitted hereafter such information as may be obtained and be required by the War Department or by Congress.

CHARLES THOMAS,
Colonel, Acting Quartermaster General.

REPORT OF THE COMMISSARY GENERAL OF SUBSISTENCE.

OFFICE OF COMMISSARY GENERAL OF SUBSISTENCE,
Washington City, October 29, 1863.

SIR: I have the honor to submit the following report of the operations of this department during the past year.

The subsistence for the army, with the exceptions of fresh beef and flour, has in great part been procured by advertising for bids, and selecting the lowest for suitable articles, in the cities of Boston, New York, Philadelphia, Baltimore, Cincinnati, Louisville, and St. Louis.

Flour has, when possible, been procured in the same manner at points nearer to our armies. Fresh beef has been obtained in general by contract; sometimes on the hoof, and at other times from the block.

On the coast of the Carolinas and the gulf, and, for a large portion of the year, at New Orleans, beef has been forwarded on the hoof from New York.

It is believed that at every point the troops have been supplied with abundance of good, wholesome food, and that if in movements of our armies a temporary want has been felt, it has not been due to any cause over which the officers of this department had control.

In addition to the troops, subsistence has been furnished to all prisoners, whether political or war, to large numbers of contrabands, and to suffering Union families found by our armies in the rebel States.

Great improvement has taken place in the rendering of their accounts by volunteer officers, although cases of neglect still exist.

The few regular officers of this department have had heavy labors and responsibilities imposed upon them, and have exhibited intelligence, integrity, and zeal.

With great respect, your most obedient servant,

J. P. TAYLOR,
Commissary General of Subsistence.

Hon. EDWIN M. STANTON,
Secretary of War.

REPORT OF THE SURGEON GENERAL.

SURGEON GENERAL'S OFFICE,
Washington, D. C., October 31, 1863.

SIR: I have the honor to submit the following statement of finances and general transactions of the medical department for the fiscal year ending June 30, 1863.

The amount of appropriations for this department remaining on the first of July, 1862, was:

In the treasury of the United States		$3,235 95
Amount appropriated per act of July 5, 1862		5,705,984 00
Amount appropriated per act of July 5, 1862		125,000 00
Amount appropriated per act of February 12, 1863		4,474,000 00
Amount refunded into the treasury of the United States:		
Surgeon Wm. Whelan, chief of Bureau of Medicine and Surgery, U. S. N., for medical supplies furnished seamen in hospital at Norfolk, Va	$1,635 20	
For hospital furniture transferred to naval hospital at Portsmouth, Va	4,453 86	
		6,089 06
		10,314,309 01

There was expended during the year ending June 30, 1863, on account of private physicians	$484,196 64
On account of nurses, clerks, and laborers	544,132 68
On account of medicines, instruments, hospital stores, bedding, and other supplies	10,566,321 03
	11,594,650 35

This expenditure exceeds the whole amount of balance, appropriations, and refundments for the twelve months, by $1,280,341 34, which excess was drawn from the appropriation of $10,080,000, made by act of February 9, 1863, for the service of the fiscal year ending June 30, 1864.

Of the appropriations for the current fiscal year there remained, on the 30th of June, 1863, in the United States treasury.	$8,522,423 27
In the hands of disbursing agents	277,235 39
	8,799,658 66

One hundred and fifty-one general hospitals were enumerated in the annual report for 1862. Many of these have been discontinued, and others constructed, as the advance of our armies and the necessities of the service required. The latest reports received give one hundred and eighty-two (182) general hospitals, with a capacity of eighty-four thousand four hundred and seventy-two (84,472) beds, as follows:

DESIGNATION.	LOCATION.
Armory Square	Washington, D. C.
Carver	Do.
Campbell	Do.
Columbian	Do.
Convalescent Camp	Near Alexandria, Va.
Douglas	Washington, D. C.
Desmarres	Do.
First Division	Alexandria, Va.
Second Division	Do.
Third Division	Do.
Emory	Washington, D. C.
Finley	Do.
Fairfax Seminary	Near Alexandria, Va.
Harewood	Washington, D. C.
Judiciary Square	Do.
Kalorama	Do.
Lincoln	Do.
Mount Pleasant	Do.
Seminary	Georgetown, D. C.
Stone	Washington, D. C.
Stanton	Do.
St. Elizabeth	Do.
St. Aloysius	Do.
Tilton	Wilmington, Del.
Jarvis	Baltimore, Md.
Camden Street	Do.
Newton University	Do.
Convalescent	Do.
McKim's Mansion	Do.
West's Buildings	Do.
Division, No. 1	Annapolis, Md.
Division, No. 2	Do.
Annapolis Junction	Annapolis Junction, Md.
United States General	Cumberland, Md.
Do.	Grafton, Va.
Do.	Parkersburg, Va.
Do.	Point Pleasant, Va.
Do.	Gallipolis, Ohio.
Do.	Frederick, Md.
Hammond	Point Lookout, Md.
Satterlee	Philadelphia, Pa.
Mower	Do.
Cuyler	Do.
Christian Street	Do.
South Street	Do.
Citizens' Volunteer	Do.
McClellan	Do.
Convalescent	Do.
Turner's Lane	Do.
Islington Lane	Do.
Officers' Hospital	Do.
Summit House	Do.
Haddington	Do.
Broad Street	Do.

DESIGNATION.	LOCATION.
Chester	Chester, Pa.
West Walnut Street	Harrisburg, Pa.
Chestnut Street	Do.
Cotton Factory	Do.
Town Hall	Chambersburg, Pa.
York	York, Pa.
Mulberry Street	Harrisburg, Pa.
Camp Letterman	Gettysburg, Pa.
Pittsburg	Pittsburg, Pa.
United States General	Hampton, Va.
Chesapeake	Fort Monroe, Va.
Balfour	Portsmouth, Va.
De Camp	David's Island, N. Y.
McDougall	Fort Schuyler, N. Y.
Fort Wood	Bedloe's Island, N. Y. H.
Fort Columbus	Governor's Island, N. Y. H.
Ladies' Home	New York city.
St. Joseph's	Do.
Newark	Newark, N. J.
Lovell	Portsmouth, R. I.
Knight	New Haven, Conn.
Brattleboro	Brattleboro, Vt.
Marine	Burlington, Vt.
Mason	Boston, Mass.
Washington Park	Cincinnati, Ohio.
West End	Do.
Marine	Do.
Main Street	Covington, Ky.
Seminary	Do.
Dennison	Camp Dennison, O.
United States General	Cleveland, O.
Do.	Camp Chase, O.
Seminary	Columbus, O.
United States General	Chicago, Ill.
Marine	Do.
United States General	Quincy, Ill.
Do.	Ashland, Ky.
Do.	Lexington, Ky.
Do.	Hickman's Bridge, Ky.
Do.	Indianapolis, Ind.
Do.	Madison, Ind.
Do. No. 1	Evansville, Ind.
Do. No. 2	Do.
Do. No. 1	New Albany, Ind.
Do. No. 3	Do.
Do. No. 4	Do.
Do. No. 5	Do.
Do. No. 6	Do.
Do. No. 1	Louisville, Ky.
Do. No. 2	Do.
Do. No. 3	Do.
Do. No. 7	Do.
Do. No. 16	Jeffersonville, Ind.
Marine	St. Louis, Missouri.
New House of Refuge	Do.

DESIGNATION.	LOCATION.
Lawson	St. Louis, Missouri.
Small-pox	Do.
Benton Barracks	Do.
Jefferson barracks	Do.
United States General	Jefferson City, Mo.
Do.	Springfield, Mo.
Do.	Rolla, Mo.
Do.	Kansas City, Mo.
Do.	Leavenworth, Kansas.
Do.	Fort Scott, Kansas.
Do. No. 1	Nashville, Tenn.
Do. No. 2	Do.
Do. No. 3	Do.
Do. No. 5	Do.
Do. No. 8	Do.
Do. No. 9	Do.
Do. No. 11	Do.
Do. No. 12	Do.
Do. No. 13	Do.
Do. No. 14	Do.
Do. No. 15	Do.
Do. No. 16	Do.
Do. No. 17	Do.
Do. No. 19	Do.
Cumberland	Do.
Prison	Do.
St. James	New Orleans, La.
University	Do.
Marine	Do.
United States Barracks	Do.
St. Louis	Do.
Charity	Do.
Convalescent	Baton Rouge, La.
United States General	Do.
Overton	Memphis, Tenn.
Jackson	Do.
Gayoso	Do.
Adams	Do.
Jefferson	Do.
Union	Do.
Officers'	Do.
Old State	Do.
Washington	Do.
Webster	Do.
Church	Do.
United States General	Mound City, Ill.
Do.	Cairo, Ill.
Do.	Paducah, Ky.
Do.	Helena, Ark.
Do. No. 1	Vicksburg, Miss.
Do. No. 2	Do.
Do. No. 3	Do.
Do. No. 4	Do.
Nashville Floating	Do.
Pest	Do.

DESIGNATION.	LOCATION.
Foster	Newbern, N. C.
Hammond	Beaufort, N. C.
Mansfield	Morehead City, N. C.
United States General	Hilton Head, S. C.
Do. No. 1	Beaufort, S. C.
Do. No. 2	Do.
Do. No. 3	Do.
Do. No. 4	Do.
Do. No. 5	Do.
Do. No. 6	Do.
Do. No. 7	Do.
Do. No. 8	Do.
Do. No. 9	Do.
Do. No. 10	Do.
Do. No. 11	Do.
Do. No. 12	Do.
Do. No. 13	Do.
Do.	Keokuk, Iowa.

The report of sickness and mortality usually accompanying the annual report cannot be compiled at this time, and when completed will be submitted as a supplement.

The number of patients remaining in general hospitals June 30, 1863, was 9.1 per cent., and in the field 4.4 per cent. of the entire mean strength of the army, of whom 11 per cent. were sick, and 2.5 per cent. wounded.

The mortality during the month of June, 1862, from disease alone, was 4.7 per thousand of mean strength; that for June, 1863, 3.9 per thousand; giving a decrease in mortality from disease that, it is thought, will be shown to have maintained throughout the fiscal year.

During the past year, the health of the troops has been good. The armies of the south and southwest have escaped epidemics of unusual severity. Scurvy has been almost unknown among them. Yellow fever appeared in the fall of 1862 at Key West, and extended to Hilton Head; the number of cases was limited, and the proportion of deaths not excessive.

The general condition of the service, in all matters of sanitary precaution and police, exhibits marked improvements over the previous year. The corps of medical inspectors, authorized by the acts of Congress of April 16, 1862, and of December 27, 1862, have, by the uniform and thorough system of inspections and reports established, added materially to the efficiency of the medical and hospital service; and the value of their labors is apparent in the prevention and prompt correction of errors and abuses affecting the health and comfort of the troops.

Two medical boards for the examination of candidates for appointments in the medical staff of the regular army were in session during the fiscal year, commencing July 1, 1862, and ending June 30, 1863.

The first board, at Washington, D. C., examined eight candidates, two of whom were found qualified; the remaining six withdrew before the examination was concluded. They also examined two assistant surgeons for promotion; one was approved, and one found not qualified.

Forty-seven candidates were invited before the second board, assembled at Philadelphia, Pennsylvania. Thirty-three only presented themselves for examination. Of these, seventeen withdrew before their examination was concluded, one was not examined on account of physical disability, fourteen were approved, and one was rejected. This board also examined seven assistant surgeons for promotion, six of whom were approved, and one found not qualified.

All the candidates approved by these two boards have been appointed.

There are at present three vacancies in the medical staff of the United States army.

Companies of the second battalion, invalid corps, composed of meritorious officers and soldiers disabled for active service, have been assigned to many of the general hospitals as a part of their organization, under the direction of the surgeons in charge. The experience of a few months warrants the belief that this military organization will prove the most economical and advantageous mode of supplying a permanent corps of nurses and attendants to such hospitals, and make available for active service the able-bodied hitherto detailed for these duties.

The Army Medical Museum, aided by the appropriation of the last Congress and the cordial co-operation of medical officers throughout the country, embraces over three thousand specimens, and has attained a value and importance that justifies the recommendation for a small annual appropriation.

The great difficulty that has been experienced at large general hospitals in procuring a sufficient number of matrons has rendered the use of washing-machines, or employment of contractors, in many cases, a matter of necessity. Additional legislation is required to enable this department to meet the expenses thus incurred. The appropriation for laundry purposes of a sum of money equivalent to the pay and allowances of the authorized number of matrons or laundresses, in hospitals where washing is done by contract or machinery, would obviate the present embarrassments.

Depots of medicines and hospital supplies are established at New York, Philadelphia, Baltimore, Washington, Hilton Head, Fortress Monroe, Newbern, New Orleans, Cincinnati, Louisville, St. Louis, Memphis, Nashville, Chicago, and San Francisco. The importance of this distribution has recently been proven by the promptitude with which every necessary appliance for the treatment and comfort of the wounded from Chickamauga was supplied from the depots at Louisville and Nashville. As adjunct to that in Philadelphia, a laboratory for the examination and testing of drugs and liquors, the preparation of powders, pills, extracts, ointments, tinctures, &c., has been found, even in its limited and experimental operations, to be advantageous and economical. A small appropriation for additional machinery is desired.

The Medical and Surgical History of the Rebellion is progressing as rapidly as the amount of material to be examined and classified will permit. The volume for the first year will probably be completed during the next session of Congress.

I am, sir, very respectfully, your obedient servant,

JOS. K. BARNES,
Medical Inspector General, and Acting Surgeon General.

Hon. E. M. STANTON, *Secretary of War.*

REPORT OF THE PAYMASTER GENERAL.

PAYMASTER GENERAL'S OFFICE,
Washington, November 3, 1863.

SIR: I have the honor to submit herewith a report of the transactions of the pay department of the army for the fiscal year ending June 30, 1863, and of its present condition.

There remained in the hands of paymasters on June 30, 1862, applicable to payments in the first quarter of the last fiscal year, the sum of $26,239,720 47; in addition to which, requisitions have been made on the treasury in their favor, and amounts received from other sources, (exclusive of those transferred from one to another,) the sum of $229,094,792 25; making a total to be accounted for in the last fiscal year of $255,334,512 72. This sum has been disbursed or accounted for as follows:

Payments to regular army	$6, 539, 386 79
Payments to volunteers	181, 596, 078 25
Payments to Military Academy	103, 345 33
Amount of requisitions drawn in favor of paymasters, but not issued from the treasury or received by paymasters on June 30, 1863	32, 816, 000 00
	221, 054, 810 37

Leaving a balance in the hands of the various paymasters to be accounted for on June 30, 1863, of $34,279,702 35.

This balance of $34,279,702 35, together with the above amount of $32,816,000, of requisitions not issued on the 30th of June last, but since drawn out, has been used in payments to the troops made between June 30, 1863, and the present date.

The balance reported in the hands of paymasters on June 30, 1862, differs from such balance, as stated in the last annual report, by the sum of $1,360,453 19, which is accounted for as follows:

Errors in the last balances reported during the fiscal year ending June 30, 1862, and subsequently corrected	$861, 273 09
Balances of dead and discharged officers, not included in this statement	326, 479 59
Balances of seceded officers, not included in this statement	172, 700 51
	1, 360, 453 19

The troops in the various armies, and distributed over the whole area almost, of the United States, have, it is believed, been paid with commendable promptness and regularity.

Funds have been furnished and distributed for the required payments in full to August 31, 1863, and payments have been made to all the armies to that date, except to the armies of the Cumberland and in East Tennessee, where the military operations in progress prevented the disbursing officers making such payments, though provided with funds, and ready to distribute them as soon as deemed proper by the department commanders. Additional funds have been furnished the paymasters of those armies to make a payment in full to October 31, 1863, and they will commence such payment immediately after the muster of that date, unless forbidden by the commanding general.

Requisitions have also been made for the funds required to pay all the remainder of the troops in service to October 31, 1863, and it is expected that these funds will be promptly furnished by the Treasury Department, and that by the 1st of December next the various armies will all be paid in full to the latest possible date, viz: October 31, 1863.

On the 4th of August last the steamer Ruth, having on board a party of paymasters, and the sum of about $2,600,000 in United States notes, for the payment of the army of General Grant, was destroyed by fire on the Mississippi river, below Cairo, and all the money on board consumed. The strictest investigations, and the inquiry of a board of officers, appointed by yourself, leave no doubt that these funds were entirely destroyed. Being in United States notes, there is no actual loss to the government, as they can be replaced by issuing new notes.

I would respectfully urge that Congress be requested to pass an act for the relief of the paymasters who are now charged on the books of the accounting officers of the treasury with the funds thus destroyed.

The officers of the pay department of the army consist, at present, of one paymaster general, with the rank of colonel; two deputy paymasters general, with the rank of lieutenant colonel; twenty-five paymasters; and three hundred and twenty-nine additional paymasters, with the rank of major. This number of officers is considered ample for the performance of all the duties of the pay department with the present size and distribution of the various armies in the field.

It has, however, been found absolutely necessary, for a proper organization of the department, and to insure the prompt and regular performance of its duties, to establish certain pay districts, generally corresponding in number and limits to the various military departments. In each of these districts a corps of paymasters is stationed, and placed under the charge and superintendence of some selected officer, who receives all the funds for the payments required in such district, distributes them to his subordinate paymasters, directs and arranges the payments to the troops, and superintends the performance of all the duties required of the pay department in such district. I believe it to be highly important for the interests of the service that these chief paymasters should have a rank above their subordinate officers, and would respectfully recommend that Congress be requested to authorize the appointment of a limited number of paymasters, say twenty-three, with the rank of lieutenant colonel, to be chosen from among the most efficient officers of this department now in service, and who can then be detached as chief paymasters of districts, or for such other special duty as may be of particular importance. The additional expense to the government under this plan will be less than $7,000 per annum, and can be much more than compensated by the increased efficiency of the force and the ability to dispense with the services of several paymasters now required in the different pay districts, and who will not be needed under such new organization. During the Mexican war it was found necessary to appoint two deputy paymasters general, with the rank of lieutenant colonel, for a similar duty, and that grade and number of officers are still retained, but are entirely inadequate for the large number of paymasters now in service, and the numerous and widely separated armies, &c., in which payments should be properly superintended. The large increase of the number of paymasters, the consequent multiplication of their accounts, and the other constantly increasing business of the Paymaster General's office, have rendered an addition to the number of clerks authorized for this office absolutely essential. I would, therefore, respectfully request that authority be asked to increase the clerical force by adding five (5) clerks of class three; ten (10) clerks of class two; and fifteen (15) clerks of class one.

I have the honor to be, sir, very respectfully, your obedient servant,

T. P. ANDREWS,
Paymaster General.

HON. E. M. STANTON,
Secretary of War.

PAYMASTER GENERAL'S OFFICE,
Washington, December 4, 1863.

SIR: In obedience to your instructions, I have the honor to submit the following supplemental report concerning the operations of the pay department of the army, from the close of the last fiscal year, ending June 30, 1863, to November 30, 1863. This report I respectfully request may be considered in connexion with the one made on November 3, 1863.

On June 30, 1863, there was in the hands of paymasters the unexpended sum of	$34, 279, 702 35
There was also in the treasury, in the shape of requisitions in favor of various paymasters, not then issued, the sum of	32, 816, 000 00
Making a total then to be accounted for of	67, 095, 702 35
Between June 30, 1863, and November 30, 1863, requisitions in favor of paymasters were made to the amount of	59, 100, 000 00
Making thus a grand total to be accounted for on November 30, 1863, of	126, 195, 702 35
Of this amount requisitions are still in the treasury unissued amounting to	6, 500, 000 00
Leaving the amount in the hands of paymasters for payment up to 30th November, and balances on hand at that date, of	119, 695, 702 35

It is impossible to state accurately what portion of this amount has been actually disbursed, and what portion is now in the hands of paymasters applicable to future payments. The payments to the 31st of October (the last regular payday of the army) have been progressing during the whole of the last month, and are now just about closing, and none of the paymasters' accounts for such payments have, of course, as yet been received. From many of the distant stations the paymasters' accounts for payments on the muster-roll of August 31, 1863, which payments were made during the two following months of September and October, have not yet reached here. In two important instances—those of the armies of the Cumberland and East Tennessee—no payment was made on the rolls of August 31, the condition of the armies and the wishes of their commanding generals forbidding the same. The payments to those armies, therefore, now just closing, cover the period of four months, from June 30, 1863, to October 31, 1863.

Under such circumstances, and with such, as yet, imperfect data, it is impossible to report in detail what amount of funds has been actually expended up to November 30, 1863, and what is the balance now in the hands of the various paymasters.

It may, however, safely be assumed that such balance is unusually small. The estimates of the amounts required for 31st October payments were found to be insufficient, owing to the large increase of the armies, under the operations of the conscription act, and the revival of volunteering under the present great inducements. Additional requisitions were required to be made to obtain the necessary funds to finish such payments, and even with these additional requisitions, the paymasters have barely had enough to close their payments, and in some instances have fallen a little short of the requisite amount. The balances of funds remaining on hand at the present date may, therefore, be safely reported as very small.

As regards the payments to the troops, it may be reported substantially that the various armies in the field are paid in full to October 31, 1863, the latest date allowable by law and regulation. No official report of the payments to that date have as yet been received from the Pacific coast, the department of New Mexico, or the army under General Banks, nor has there been time for such reports to reach here. Sufficient funds for the payments at those stations were, however, forwarded in due time, and at each a force of paymasters was in readiness to receive the same, and at once commence its disbursements. These payments are, therefore, most probably finished before this date.

The army at Chattanooga had been paid in full before the last military operations there, except a portion of General Sherman's command, which he had brought overland from the Mississippi, and which could not be reached by paymasters till it arrived at Chattanooga. Payments were going on in this command when the late movements commenced, and the paymasters were ordered by General Grant to retire with their funds to Nashville and await further orders.

Twelve paymasters were engaged in paying General Burnside's army around Knoxville when the late attack was made on him by the rebels. They have remained at Knoxville, and have not been heard from since the siege of that place commenced.

The payments in the army of the Potomac were completed, except a few brigades, before the late movements. They have now been resumed, and will be entirely finished during the coming week.

With the exceptions above stated, all the troops in service throughout the country have been paid to October 31, 1863.

I have the honor to remain, sir, with highest respect, your obedient servant,

T. P. ANDREWS,
Paymaster General.

Hon. E. M. STANTON,
Secretary of War.

REPORT OF THE BOARD OF VISITORS OF THE U. S. MILITARY ACADEMY AT WEST POINT FOR 1863.

SIR: The session of the board of visitors commenced on Monday, June 1, and continued from day to day to the 16th of June. The first class was examined in the presence of the whole board. In accordance with usage, two divisions of the board simultaneously examined the other classes in sections.

Daily sessions of the board were also held for conference and discussion, and special committees were appointed to inquire into the details of the various subjects presented for our consideration.

Great harmony has marked the discussions and decisions of the board, although all sections of the loyal States and various shades of opinion, political and religious, were represented. Some of our number came with objections and prejudices against the institution. But all doubts as to the value and importance of the institution were banished by the evidence presented in the course of our personal inquiries into its present condition and actual results.

The war of 1812 and the Mexican war clearly evinced the value of military science; and the experience and possibilities of the present struggle demonstrate the necessity of maintaining, and even enlarging, our Military Academy. Aside from its primary object, this academy incidentally holds an important relation to other literary institutions, to the general progress of the nation, and especially the development of its material resources, as well as its military organization and efficiency.

This Academy belongs to the whole nation. So far as its purpose and numbers permit, it is the people's college. It is maintained for the special benefit of no particular section, State, sect, party, or class. The cadets represent all occupations, sects, and parties, and almost all nationalities among us. (See Appendix A.) The poor are not denied its privileges, for the expenses of all are paid alike by the government. If particular dogmas have at any time unduly prevailed here, the fact is an accidental rather than an essential one, and should be referred to the ruling influences at the seat of government, and in the States from which the cadets are appointed, and not to any inherent elements in the local organization at West Point.

We made careful inquiry as to the standard of morality, theoretical and practical, at West Point. We were unable to discover any foundation for the distrust or prejudice sometimes expressed on this ground. The standard of morality and personal honor here indicated is pure and unobjectionable. Intemperance and its kindred vices, so far from being prevalent, are strictly guarded against and most successfully repressed. The sale or purchase of any intoxicating liquors by the cadets is utterly prohibited. In respect to temperance, West Point Academy is not equalled by any college within our knowledge. The first, second, and third classes in the academy have, as individuals and as classes, voluntarily taken upon themselves a pledge of honor to abstain totally from all intoxicating liquors during their connexion with the institution, coupled with the further understanding that, as a point of personal honor, it is the duty of each member of the class to report every infraction of their mutual pledge that may come to his knowledge when on duty. The practice of reporting all violations of rules appears to be strictly observed by the cadets, even against personal friends. Liquor was recently found in the room of one of the cadets by a classmate and friend, who at once reported him for a supposed violation of his pledge. On inquiry it was found that the liquor in this case was used under the prescription of the regular surgeon of the post. The reporting cadet, however, was regarded as having only done his duty, and the act of reporting was approved, not only by the class, but by the supposed offender.

The text book in ethics used for the last six years is Wayland's Moral Science, *unabridged;* but, owing to the too narrow limits assigned to the department of ethics in the course of study, much important matter in Dr. Wayland's treatise is practically neglected in the recitation room.

The loyalty of the *great majority* of the graduates of West Point is a most gratifying fact. The principles of the professors and their processes of instruction, the daily drill and discipline of the institution, and the incentives to duty constantly presented to the cadets, are all fitted to develop a spirit of patriotism. A single fact will indicate how heartily the professors of the academy are enlisted in the present struggle for the support of the government. Sixteen sons or sons-in-law of the professors of this academy are now in the federal army, or have fallen in defence of the country during this war, and not one has betrayed any symptoms of treason.

According to a tabular statement drawn up by Edward C. Marshall, author of the History of the United States Naval Academy, nineteen graduates of the Military Academy at West Point from the free States resigned their positions in the army during the period intervening between November, 1860, and January 1, 1862, fifteen of whom entered the rebel service, while the other four are regarded as in sympathy with the rebellion. One hundred and seventy-eight slave State graduates resigned, making in all one hundred and ninety-seven graduates of West Point who have dishonored themselves and their *alma mater* by their shameless treason. On the other hand, one hundred and thirty-three from slave States, and six hundred and twenty-three graduates from free States, in all seven hundred and fifty-six, (756,) have maintained their loyalty, and have been fighting for the integrity of the country.

A majority of five hundred and fifty-nine have evinced their fidelity by perilling their lives in defence of the country. It was not at West Point that the disloyal graduate learned treason. Southern students had no need to come to this academy, or to any northern institution, to imbibe the baneful doctrines of secession. They have been thoroughly imbued with their peculiar views of State rights from their childhood. Many graduates of Harvard, Yale, and Princeton have become traitors. It is no more the fault of West Point than of the best colleges of the north that they were not able to repress all tendencies to the heresies of "State rights" and secession.

As a touching commentary on the views here presented, we note the fact that it was the sad privilege of the board, on the last Sabbath of our stay at West Point, to follow to the grave the remains of Colonel B. F. Davis, a graduate of this academy, and a native of the State of Mississippi, who "faithful among the faithless found," at the breaking out of the rebellion renounced home, friends, and all the ties of early associations, and offered his sword to his country. And now, having sealed with his blood his loyalty to the nation that educated him, he comes in his exile to ask a grave at the hands of his *alma mater.*

INSTRUCTION.

The classes were examined in engineering, civil and military, ordnance, and gunnery, infantry, artillery, and cavalry tactics, mathematics, natural philosophy, optics, astronomy, mineralogy, geology, and chemistry, in the French and Spanish languages, and the various English studies, and drawing. The higher mathematics, so essential to military science, are probably pursued to a greater extent here than elsewhere in this country. The exercises evinced great learning, ability, and thoroughness on the part of the permanent professors in the institution, as well as patience and fidelity in the personal training of individual pupils.

The department of ethics seems to us far too limited, both in the range ot topics and the time devoted to them. Our duties to our fellow-men, to our country, and to God, deserve a more distinct recognition and fuller attention than the present programme of study, made necessary, in part, by the low standard of admission, permits. The duties of the professor of ethics are too various and multiplied. He is the honored chaplain of the institution, an office which might not improperly command his undivided labors, in the form of familiar intercourse and personal influence, as well as his public ministrations on the Sabbath, and in the religious meetings of the cadets, voluntarily held twice each week. But, in addition to all these duties, he is the professor of ethics, law, history, rhetoric, English language and literature, grammar, geography, reading and elocution. In most colleges these subjects constitute four or five distinct departments. Experience demonstrates the wisdom of subdivision of labor and concentration of effort. The embarrassments experienced in devolving so varied duties upon a single professor are very much increased by the fact that, for the sake of greater thoroughness and personal drill, the cadets are not taught in "classes," but in small "sections." Thus, for example, during the last year two classes, the first and the fourth, have, in this department, been instructed in ten sections—a plan which multiplies the labor of instruction, as well as stimulates thoroughness of study. Two or three permanent professors are needed who have attained acknowledged eminence in these particular branches, and who will continue to make them a specialty. This necessity for increase of permanent professors would be in some degree diminished if, as we elsewhere recommend, the mastery of most of the studies just named be made a condition of admission to the academy.

The instruction of this institution is greatly impaired and the true progress of the cadets hindered by the employment of assistants, either incompetent or where mere attainments are ample, without tact and adaptation for teaching. Facts show that cadets "distinguished" in graduation, when long engaged in the service, perhaps on the frontier, removed from libraries and opportunities of culture, sometimes not only relinquish habits of study but acquire an aversion to severe and concentrated mental effort necessary to the highest success in teaching, while there are others who, in the face of whatever embarrassments, are students and thinkers through life. We would, therefore, most respectfully but earnestly suggest that the learned professors of the academy who may be supposed to be the best judges of the teaching capacity of the graduates be consulted in the appointment of their assistants.

Next to the evil of incompetent assistants is that of the frequent changes of teachers, which sacrifices the benefits of experience, hinders thoroughness of instruction, and tends to introduce confusion and weakness in the place of system, efficiency, and progress. In the examination just closed, the difference in the appearance of different sections was in some instances plainly owing to the character of the teacher as well as to the studiousness and ability of the cadets. In one section where a considerable number failed in the examination, the assistant seemed to be justly held responsible in no small degree for the result. There is, however, a marked difference between the first two and the lower sections in each class—a contrast due largely to the great difference in the qualifications of the cadets upon admission, while the higher sections in each class evinced scholarship, character, and force; there were others who furnished living proofs of the radical defect of our present system of appointments to West Point. The admirable teaching of the distinguished professors who have so long and successfully conducted their several departments needs no commendation from us. They are aided by some most excellent assistants, but they are embarrassed continually by two great hindrances to their highest success and to the efficiency and usefulness of the academy: first, the want of permanence, tact, skill, scholarship, and uniform methods at the head of some of their section rooms; second, the want of talent, application, energy, scholarship, and aptitude on the part of not a few cadets whom they are expected by a sort of miraculous power to transform into officers fit to command in posts of the highest responsibility. Able and learned as are the professors, they cannot create talent where nature has given none.

While West Point has done much for the country, and under favorable circumstances, and with certain needed changes may be confidently expected to accomplish still more for the nation, this academy may, in turn, reasonably demand that it shall be furnished with the very best material which the country affords; with candidates capable of military education, and emulous of military distinction; and that cadets justly rejected as incompetent, or as unworthy of a place in the institution, shall not be thrust back upon it, by political influence, to encumber and degrade the academy.

There is evidently need of a more careful and thorough training of the voice on the part of the cadets. We are told that there has been some improvement in this direction, but there is an obvious and urgent demand for much greater progress. Articulation, enunciation, expression, and the whole subject of vocal culture should receive more attention. In these points this academy does not compare favorably with other institutions within our knowledge. A clear, distinct, cultivated, and commanding voice is an element of great power in inspiring and controlling men. In view of its practical importance to military officers, the cadets should be thoroughly drilled in the most scientific methods of vocal culture.

The present board of visitors labored under some embarrassment, from the fact that all were inexperienced in the special duties here assigned them. Such, we learn, has been the history of former boards. In view of the difficulties which strangers must encounter in examining an institution so large and peculiar as the United States Military Academy, and the desirableness that each successive board should have the benefit of the experience of their predecessors, we would recommend that two or three members of some former board be hereafter appointed on each board of visitors. This arrangement will tend to economize their time, give more of unity and thoroughness to their investigations, and harmony to their results. We would not advocate a permanent board of overseers or trustees, such as experience has proved most effective for our colleges. Their relation to the college is, in several essential points, unlike that of the visitors to the West Point Academy. Here there is an obvious propriety in inviting new visitors from different States, and from all sections of the Union, to meet from year to year and investigate its affairs. The presence of two or three former visitors will serve to connect the past with the present, and bring the lessons of former experience to facilitate the daily work of the board.

The building for the library and astronomical and philosophical apparatus needs a roof without delay. The present roof leaks very badly in probably more than twenty places. The plastering in the ceiling in several rooms has fallen by being often wet, endangering very valuable philosophical and astronomical apparatus. The astronomical instruments, costly and excellent originally, are being injured by the dampness consequent upon saturated walls and floors. The building itself, costing nearly fifty thousand dollars, will be seriously injured if this leakage continues. The snow, banking up against the numerous turrets near the eaves, melting and freezing, makes a dam which retains a large quantity of water on the roof, till it finds its way into the apparatus rooms, and even down into the library on the first floor. A subterranean-like dampness, which rusts the steel screws of the telescopic instruments, we need not say must be injurious to the health of the operators and of the occupants of the room.

In the original plan of this building it was designed that the lower rooms, except that used for the library, should be occupied by the class sections in astronomy and philosophy. It seems to us very clear that they should be restored to their original design. At present the recitation rooms in this department are in another building, so far removed from the apparatus as to make it impossible to take each section from their recitation room to receive the proper illustration by aid of apparatus without great inconvenience and loss of time. The two were intended to be, and should be, in juxtaposition. This needed change may be made with little or no cost by simply transferring the offices of the adjutant, treasurer, &c., to another building especially convenient for their purposes.

The provisions both by regulation and usage for the religious instruction of the cadets seem to us too limited. In all the colleges and universities of this country some religious service is daily held. While we would sacredly guard the rights of conscience, and use no coercion that should violate the honest convictions of any cadet, we deem it essential to their highest moral and intellectual culture that they should daily observe a short religious service under the direction of the chaplain, so brief as to obviate all objection on the ground of want of time. To the use of the Lord's prayer and the reading of a few verses of Scripture none would object. The chaplain informs us that, in his judgment, the service should range from four to eight or ten minutes.

We have been called an irreverent and irreligious nation. Events are proving that our institutions can be permanent only as they are founded on the broad principles of a common christianity cherished in the hearts of the people. Certainly our national academy should, like all the other great literary and collegiate institutions of the land, daily and publicly acknowledge our dependence upon the Supreme Lawgiver, and our need of the instructions of His word.

The only regular service prescribed for the cadets is that of Sabbath morning. There is a voluntary service in the afternoon, and also a prayer-meeting held twice a week, commenced some two years since, and continued without interruption to the present time, with an attendance ranging from ten to thirty.

The board would recommend that the propriety or impropriety of Sunday inspections and parades should be determined by their tendency to promote or to interfere with the religious improvement of the day at this institution. We would urge the necessity of a higher and surer moral standard than can be furnished by any code of honor that the world has ever seen.

We have already expressed our gratification in witnessing so many indications of the deep sentiment of personal honor among the cadets. Much as this is to be commended and encouraged, it should be ever remembered that there is a sentiment still more essential and fundamental. The principles of all codes of honor are variable and uncertain. They are the work of man, and are, therefore, without wisdom or sanction higher than his. But there are great and definite and unchanging obligations to our fellow men, to our country, and to God; and the knowledge of these, and the possession of a sound and all-comprehensive code of morals, with the life of religion in it, are equally necessary to true honor and true virtue. For its bearing upon the discipline of the academy, and the highest qualifications of its members for service of the country, the board would urge an increased amount of moral and religious instruction.

From the schedule of studies we find that during the last year there have been given to *the first class* two hundred lessons of three hours each in engineering; one hundred lessons of one hour each in ethics, Spanish, mineralogy, and geology, and cavalry exercises, respectively; forty lessons of two hours each in ordnance and gunnery, and fifteen lessons of two hours each in cavalry tactics. *To the second class*, two hundred lessons of one and a half hour each in philosophy; one hundred lessons of one hour each in chemistry, of two hours each in drawing, of one hour each in cavalry exercise; fifteen lessons of two hours each in infantry tactics, and ten lessons of two hours each in artillery tactics. *To the third class*, two hundred lessons of one and one-half hour each in mathematics, two hundred lessons of one hour each in French, one hundred and sixty lessons of two hours each in drawing, and forty lessons of one hour each in cavalry exercise. *To the fourth class*, two hundred lessons of one and one-half hour each in mathematics, one hundred and thirty lessons of one hour each in English studies, fifty lessons of two hours each in French, and sixty lessons in fencing exercise.

This schedule shows that the mathematics here occupy a large share of attention. This study should be prominent not only as a mental discipline, and in view of its obvious practical utility, but as fundamental in the military science and art. In this department, as in others, we have elsewhere aimed to show that the requirements for admission should be materially increased. Time will thus be gained for a fuller investigation of the various difficult and yet essential branches of military science, and also for the pursuit of new studies, foremost among which we should place botany and zoology, and the physical geography, statistics, and resources of our country. Our army officers are frequently detailed for special duty, to survey routes for military roads through unfrequented regions, and required to note not only the character of the soils and minerals, but the vegetables and animals found on the line of their survey.

DISCIPLINE.

The board of visitors have been minute in their inquiries, and deliberate in their consideration of the subject of discipline. We cannot but commend the wisdom and foresight of those who established the regulations of this institution, and the faithfulness and good judgment of those who now administer its government. The rules are at once comprehensive and minute; the penalties seem as well proportioned to the offences as they can be under any code of laws, and they are qualified and guarded in their application by a limited discretionary power in the hands of the officers of the academy. There appears to be also, both in the theory and administration of the law, a fair discrimination between offences against morals, and violation of local rules. The full expression of this difference is provided for by two classes of penalties: one consisting of graduated demerit marks attached to specific negligences and improprieties, and the other made up of various punishments, determined by courts-martial, for graver offences. In respect to the latter class, however, the board find that the efficiency of the system is much impaired by the fact that the decisions of the academic and military staff of the institution, and of courts-martial, are subject to review and reversal elsewhere. It cannot be denied that both of these tribunals are in a position eminently favorable to decisions at once just in themselves and promotive of the highest good of the school. They are at the place where the offence is alleged to have been committed; where witnesses are most numerous, and most subject to scrutiny; where the accused has, to the greatest extent possible, the means of just and legitimate defence; and where the necessity of punishment, the possibility of withholding it with safety to the interests of the institution, and the condition of its alleviation, or the propriety of its remission are all best understood. The academic board and the courts-martial are constituted and detailed for this judicial duty, and there is in this fact a guarantee that the administration of justice will be at once mild and impartial. Surely it is unwise in all ordinary cases to place the power of reversing their judgments in the hands of a distant official who has none of their advantages for arriving at correct decisions, and who has great and peculiar difficulties in the way of right action; to remove the power of final decision from well-constituted courts and throw it into the field of personal and political influence. The effect is seen at once in diminishing a wholesome fear of the law, and respect for those who administer it, and in preventing that thorough and efficient discipline which the officers of the institution are expected to maintain. We, therefore, recommend that the decisions of the academic board and court-martial be final except on the production of new and controlling evidence.

The board would fail of giving to their report its due weight, if they did not state in this connexion that they came to this investigation prejudiced more or less against particular features of the school, and provided with suggestions for the correction of abuses and for the greater efficiency of the academy. Upon examination into existing evils—and such are found in every educational institution—and into the remedies that have been tried and that are now resorted to, they have become more and more impressed with the breadth and minuteness of the regulations for the government of the academy, the variety and fitness of the means of enforcing discipline, ranging, as they do, from absolute and irresistible force up to the slightest appeal to a sensitive honor, and with the union of earnestness and kindness which characterize the present administration of the whole system. Under these advantages the institution has certainly reached a highly satisfactory state of discipline. The sense of honor has been developed in an unusual degree, and has been made to include within its range, not only military offences, but others of a more strictly moral character. Various forms of dishonesty and falsehood, as well as those misdeeds that are sometimes apologized for by the young when under restraint, are thus embraced among offences which the cadets will not tolerate in their serious intercourse with each other, or in their transactions with the officers of the institution. In the progress already made in this direction, there is good reason to hope that as ethical principles are more and more practically and earnestly taught, and the motives and consequences of daily conduct are more fully scanned, the same principles of honor may be found to forbid some actions that are now tolerated, and to guard more fully even the slightest of the personal rights of the newest and rudest members of the corps.

The board have noticed with pleasure the ready obedience which is given to any cadet whom the law for the time being clothes with its authority. The principle thus inculcated is one which is peculiarly needed in our country, not only in the military, but also in every department of the civil service. The law in our political system is the expression of the sovereign will of the people. It proclaims, or should proclaim, the decision of the intellects and consciences of the people, and should have an authority second to that of God only. The individual among us who is at any time, or in any place, invested by the law with any portion of its dignity and power, is entitled to a measure of honor and obedience to which the commission of king or emperor could give him no claim. The lesson equally of command and obedience which is here taught so fully is one of peculiar value; and if it has never been found practicable, except in connexion with a military organization and training, to induce students thus to share in the government of a school or college, and so to train themselves for the duties of citizens, then here is an argument in favor of this institution, aside from the military advantages which it secures to the country.

HEALTH AND PHYSICAL COMFORT.

The subject of the health and physical comfort of the cadets occupied much of the time and attention of the board. The mess-rooms were repeatedly visited at meal time, not only by the sub-committee, to which this subject was referred, but also by other members of the board, and the character and kind of food provided was closely scrutinized. The materials provided were usually found to be ample in quantity and of fair quality, though there was much complaint of one or two staple articles; but after careful investigation we found, that although there was at times cause for some dissatisfaction in respect to the quality of the material, the real difficulty lay in the imperfect modes in which they were prepared for the table, resulting, in part, from carelessness and want of skill in the employés, but chiefly from the defective construction and equipment of the kitchen, which rendered good cooking a simple impossibility. With the completion of the new kitchen now building, this cause of complaint will disappear, and with it, we trust, all real grounds of dissatisfaction as to their fare on the part of the cadets.

The general arrangements for the preservation of the health of the cadets, such as bath-rooms, hospital accommodations, and an extensive and well-arranged gymnasium, are truly admirable. The bath-rooms are neatly kept and furnished, and every cadet is required to bathe, at least, twice a week, at certain prescribed hours. The hospital accommodations are ample, and are kept in a manner that does credit to the post surgeon. One defect only was observed in this department, namely, the totally insufficient appliances for hot and cold baths, so indispensable in every well-regulated hospital, and we respectfully suggest the propriety of a small appropriation for this specific purpose. The gymnasium, riding hall, and the various military exercises are admirably adapted to conserve the health and develop the physical system, and the board were highly pleased with the vigor, symmetry of form, and carriage of the corps of cadets, which contrasted with the awkward movements of the new recruits who were just entering the institution; strongly attesting the value of the methods of physical education here practiced. The brief time allotted to repose, namely, from 10 o'clock p. m. to 5 o'clock a. m., suggested the doubt whether it was in all cases adequate to the physical wants of the system at the period in life at which cadets enter the academy. But practically, as we learned, any deficiency in this respect can be made up during the hours of relaxation.

The buildings are well ventilated, heated by steam, and are, so far as we observed, uniformly well kept.

FISCAL AFFAIRS.

Two or three points deserve notice under this head. The pay of the cadet, as now fixed by law, is $30 per month, but from this sum $2 per month is reserved, as an accumulating fund for the purchase of an outfit when, on graduation, he is called upon to enter the army. This leaves him but $28 per month, which is placed to his credit on his account for board, clothing, books, stationery, and other necessary articles, which are issued to him by the quartermaster only on the written permit of the superintendent or of the commandant of cadets, and no money is paid to him at any time save by special permit of the superintendent; yet, notwithstanding the fact that the most rigid economy is practiced by and for the cadet, and that all luxuries are excluded from the mess hall, in order to keep the cost of board at the lowest practicable rate, very few cadets leave the institution free from debt, which must be paid by their friends, or reserved out of their accumulated "equipment fund," or otherwise it must be reserved out of their wages as officers of the army.

The total indebtedness of the whole corps at the period of their last bi-monthly statement, April 30, is found to be $7,682 71. From this, however, there should be deducted the sum of $1,188 92, due to some of the corps, leaving a balance of indebtedness against them as a body of $6,493 79. The total indebtedness of the graduating class at that time was $985 09. Total amount due to members of same class $35 17, leaving a balance of indebtedness against the class of $949 82. The largest indebtedness of any individual member of the class was found to be $96, wholly absorbing his reserved equipment fund, and leaving him nothing with which to purchase the indispensable outfit of an officer of the regular army. The largest balance in favor of any member of the class was $20 64, and these credits rarely occur, save in cases where cadets receive money or clothing from their friends at home.

Now it is too obvious to need argument, that if the government proposes to furnish a gratuitous military education, it should do it in a manner worthy of a great nation, meeting fully and adequately all real wants, neither fostering habits of luxury and self-indulgence on the one hand, nor compelling the cadet on the other to contract the ruinous habit of falling in debt and anticipating money he has not yet earned. The third alternative, that of drawing money from home, is manifestly unjust to the poorer class in the country, practically excluding them from the privileges of an institution which should be open to all classes without distinction. But it may be asked, are not the cadets extravagant in their expenditures? If other reply is needed than the facts already stated, that they are not permitted to purchase even a dime's worth of letter paper without a written permit, we may be allowed to add that after scrutinizing their accounts, which were submitted to our inspection, we are bound to acquit them of the charge. It should be remembered that the price of every article which they use has risen enormously during the last eighteen months. In view of these facts, we earnestly recommend that their pay hereafter be fixed at $20 per month and two rations, which, at the present rate of commutation of rations, would amount to $38 per month, and this, it should be observed, is $7 per month less than is allowed to the cadets in the Naval Academy at Newport, though it is difficult to imagine a reason why one should receive more than the other.

A second matter deemed worthy of your attention is the fact that by a recent act of Congress, approved March 3, 1863, entitled "An act for enrolling and calling out the national forces, and for other purposes," providing "that enlisted men now or hereafter detailed to special service shall not receive any extra pay for such services beyond that allowed to other enlisted men," great injustice has been done to some of the indispensable employés of the Military Academy. Under the regulations, all assistants in the institution, other than the professors and members of the academic and military staff, must be enlisted men, although in some cases, such as that of the assistant librarian, and certain assistants to the professors of chemistry and natural philosophy, and the lithographer of the institution, much literary and scientific knowledge and considerable mechanical skill are indispensable. Yet under the provisions of this act (which was probably never intended to apply to West Point) these valuable men, whose services anywhere else would command high wages, are reduced to the necessity of attempting to support themselves and their families on the slender pay of a private soldier in the regular army. We cannot, therefore, too strongly urge upon your attention the necessity of some adequate provision for these men, both as a simple act of justice to them, and as essential to the interests of the academy.

ADMISSION OF CADETS.

In concluding the report of their inspection of this the only national military school to which the country naturally looks for the organization and command

of her armies and the construction of her works of defence, the visitors would respectfully urge on the consideration of the department an immediate and thorough revision of the law and regulations relating to the admission of cadets—the number, the qualifications required, and the mode of ascertaining these qualifications, and of making the appointments. No matter how appropriate may be the location, how complete the buildings and equipment, and how skilful and faithful the teachers, unless there is a constant and sufficient supply of pupils of the right age, character, bodily and natural vigor and aptitude, as well as aspirations for a military career, the public will be disappointed in the practical workings of the institution.

1. The number of pupils in the Military Academy is determined by the law, which limits the cadet corps of the United States army to one cadet for each congressional district in the several States, one for each Territory, one for the District of Columbia, and to forty more, whom the President may appoint, ten each year, from the country at large, without reference to their residence. Under this law, if each congressional district and Territory was represented, the whole number of cadets would be two hundred and eighty; but owing to vacancies by withdrawal or non-appointment in congressional districts in the States involved in the rebellion, the number at this time is reduced to less than two hundred, and the graduating class of 1863 to twenty-five, a number altogether inadequate for the regular army in time of peace, and much below the present and future exigencies of the service, while the expense of the academy remains the same. We are assured by the superintendent that without any additional expense for building and material equipment, and with a small advance in the pay of pupils and assistant teachers, the cadet corps could be increased to four hundred. The visitors are unanimously of the opinion that the corps should be at once increased to this number, and should be maintained at this maximum at all times, by authorizing the President to appoint to any vacancy which may remain unfilled for three months by reason of nullification, secession, rebellion, or any other cause. If the appointments to fill and maintain the corps at this maximum can be selected out of the many American youths ambitious to serve their country in the army, on the plan of an open competitive examination in the several States, the visitors believe that ninety out of every one hundred thus appointed will go through the whole course with honor, and the average ability, scholarship, and good conduct of the whole corps will equal that now reached by the first ten of each class.

2. By the original law providing for the appointment of cadets to the corps of artillerists and engineers, and by the act of 1812, by which the Military Academy was made to consist of the corps of engineers, the candidates for cadets were to be "not under the age of fourteen, nor above the age of twenty-one years." By regulations of the department the minimum age is fixed at sixteen years, and the visitors believe that the interests of the academy and the military service will be promoted by making the legal age for admission between eighteen and twenty-one years. The four years preceding and including eighteen are peculiarly the formative period of the body, mind, and character, and should be devoted to the acquisition of right habits of study and general culture, as the proper foundation for all special and professional training, which should not be commenced until the constitution is consolidated, the taste for a pursuit is distinctly pronounced, and the moral character is naturally developed under the influences and supervision of home. The experience of Europe, and particularly of France and England, has led to the abandonment of juvenile military schools as nurseries for officers; and the very common practice of nominating candidates who exceed the legal age expresses the convictions of our own people that military studies now require more maturity of mind than was deemed necessary in the early history of the academy. The present want of uniformity as to age and mental discipline explains, in part, the wide disparity of attain-

ments between members of the same class. With few brilliant exceptions, confined to cadets of rare aptitude and vigor of mind, the most solid practical education is obtained by those who come to West Point when at least eighteen years of age, with at least a good preparation in English studies, and a taste for mathematical studies or military pursuits.

3. The school attainments required by law of candidates for admission to the Military Academy are as rudimentary and limited as our language can express—far below, we are assured, the requisitions of any similar school in the world. Prior to 1812, when the academy was little more than a school of mathematics, taught by two professors, in the line of geometrical and algebraical demonstrations, and the practical exercises were confined to surveying, and the simplest forms of military construction, the candidates were not subjected to any examination. The act of 1812 provides that "each candidate previously to his appointment shall be well versed in reading, writing, and arithmetic," and by regulations of the department the knowledge of arithmetic is restricted to only a portion of that science. These were special reasons at the start for thus limiting the amount of knowledge, when the minimum age of admission was fixed at fourteen years, and the academy was properly a juvenile military school, like all cadet schools in Europe at that time. At that date science entered far less than now into the art of war, as applied to the means and modes of attack as well as of defence. Besides, the opportunities of even elementary instruction were then far less widely or equally distributed through all the States than now, when the general government has set apart over sixty million acres of the best land in aid of primary schools in all the new States, and nearly every State legislature has subjected the entire property of their several communities to taxation for the support of public instruction. Now that the requirement as to age has been advanced from the fourteenth to the sixteenth year, and by the voluntary action of parties having the nomination, or seeking the appointment, to the eighteenth year, we see no reason why the school attainments corresponding to and compatible with that age should not be also required. The least that should be demanded of any candidate is that amount of general culture and attainments which constitute a good English education, and which it is now the aim of the public schools, and their boast, to give without partiality to all, poor and rich alike, if the advantages they proffer are properly improved. And we see no injustice in fixing the standard of general attainments and culture as high as that now reached by cadets in good standing at the close of their first year in this academy, including even an elementary knowledge of one modern language. If the French, or Spanish, or German language is to be mastered by American officers for the sake of the military science and literature which it embodies, or its uses in conversation, or official duty, called for by the exigencies of our foreign relations, both in peace and war, its acquisition should be begun as early in life as possible, while the organs of speech are flexible, and the grammatical and etymological difficulties of a new language are more readily surmounted. Judging from the results of the examinations we have witnessed here, and what we know of the attainments made by students in colleges elsewhere, very few persons who begin the study of modern languages late in their school life, in the pressure of other studies, ever attain the mastery of even one, so as to be able to use it as an instrument of written or spoken communication, or make its treasures of science and literature a familiar possession. Whatever may be thought of the disciplinary and practical value of earlier and longer attention to one or more modern languages, to those whose minds will otherwise be almost exclusively subjected to the peculiar training of the mathematics, there can be no doubt that young men who have reached the age of eighteen, and desire to profit by the special studies of a purely military school, should exhibit in their language, habits, and attainments, that intellectual, moral, and esthetical culture which the public or private schools of any State can, and should, give to all its youth of that age.

4. Low as the requirements for admission now are, from a defective and vicious mode, as we believe, of selecting candidates and making appointments to the cadet corps, the number of candidates nominated and provisionally appointed, who present themselves at West Point and shrink from any examination, or who fail to pass even the entrance examination, which is confined to reading a few passages of familiar English prose or verse, and writing a few sentences from dictation, and performing on the blackboard a few operations of the most elementary character in arithmetic, or, being admitted, are not able to gain or keep a respectable standing for one year, although the studies of the first year belong to a general, and not a military education, or, by a "special providence," manage just to escape dismission from incompetency, and graduate, is disgracefully large. The country abounds in youth competent to master and profit by the course of instruction here provided, and ambitious of enjoying these privileges of education and opportunities of distinction; and a selection by lot from the juvenile population of any State could not result in so few prizes, and such a dreary waste of blanks as have been realized from the appointments made, in the unavoidable absence of all personal knowledge of the candidates by the appointing power, on the recommendation or nomination of one or more persons in each congressional district in no way responsible to the country for the incompetency of the individuals recommended. From official tables, prepared from the records of the academy, it appears that the proportion of all who graduate to all appointed in successive periods of ten years is as follows:

For ten years from	1802 to 1811	0.606
Do.	1812 to 1821	0.289
Do.	1822 to 1831	0.377
Do.	1832 to 1841	0.472
Do.	1842 to 1851	0.510
Do.	1852 to 1861	0.523

From official memoranda and returns furnished by the superintendent, a portion of which are hereto appended, (B, C,) it appears (appendix D) that out of 4,626 who have been admitted to the corps of cadets, (including two hundred now members,) only 2,020 were able to graduate; and of those who failed, (2,398, excluding those who remain,) more than three-fifths broke down in the first year in studies which in almost every military and scientific school in Europe are required for admission. Out of the whole number regularly nominated, recommended, and provisionally appointed from 1841 to 1863, more than twenty per cent. failed to pass the examination, as to health and constitution, or the slight examination in reading, writing, and ciphering. And this proportion would be increased by the number who withdrew in advance, from the consciousness of their unfitness for a position to which ambitious and influential friends had promoted them. Out of the whole number admitted from 1851 to 1862, more than one-third failed during their first year. The proportion of the whole number who have graduated to the whole number admitted, from the establishment of the academy, is 46 per cent., and of those who failed to graduate, 54 per cent.

The visitors are unanimously of the opinion that in a matter of such vital importance as the right organization and command of the armies of the United States, on which the honor and safety of the whole country depend, the original appointment to the cadet corps, which is the *first step* in promotion to such command, as well as to all the special duties which attach to the engineer service, should not be made in any case, except on the principle of finding the best youth for the place, having the health, character, vigor of body, maturity and aptitude of mind, and preparatory knowledge, to profit by the opportunities of the special military training provided by the government for this corps, and a decided taste and expressed desire for a military career. And to this end the law and regulations should provide for the rigorous exclusion in advance of all who cannot present testimonials from the teachers under whose instruction they have been for the two years next previous that, in their opinion, they possess the qualifications above specified, and who do not make a written declaration of their desire to enter the corps for the purpose of qualifying themselves to labor in the military service of the government, to which they will bear true allegiance against all enemies, foreign or domestic, and over all State and local authority, government, and constitution whatever. To select the best out of any number who may present their testimonials and written declarations, public examination should be held of all applicants at such times and places as the law should prescribe, by such persons and under such regulations as the department shall be authorized to appoint; and the results of such examination of each person examined, and in each subject specified by law, should be returned to the department, in which return the applicants found qualified should be arranged in the order of merit. From this merit-roll, revised from year to year, all appointments to the cadet corps should be made, and in the order of merit assigned by the examiners.

The principle of appointment and promotion by merit which we advocate is in full and successful operation in the classification and advancement of cadets in the academy itself, and the country will be satisfied if the same principle can be as fairly and vigorously enforced on all who aspire to enter, as well as on all promotions in the service after leaving the institution. The principle itself, of selection by merit, either in the mode of public examination or of careful and searching inquiries by competent and impartial educators designated for this purpose by the parties to whom custom and not law has assigned the grave responsibility of nominating candidates, has been voluntarily applied in several congressional districts. Not a cadet known to have been thus selected and appointed has ever broken down from want of vigor of body or mind, or failed to reach and maintain an honorable position on the merit-roll of the academy; and to this careful selection by those who felt the responsibility of the privilege accorded to them is the country indebted for its most eminent and useful officers.

To the objection that the mode of selection by public competitive examination will involve expense, we reply, that any expense which will do away with the prejudices against the academy, which the present system of patronage has done so much, directly and indirectly, to evoke and foster, and which will, at the same time, exclude incompetent and secure the services of vigorous, talented, and well-trained officers for every arm of the service, will be well incurred.

But, in our opinion, there will be no more expense in selecting and educating a given number of cadets on this plan than on the present. The two thousand cadets who were appointed by patronage, and failed to graduate, cost the government, directly or indirectly, each year a much larger sum than it would have taken to have excluded them in advance from the institution by competitive examination, and filling their places by better men; and their exclusion, by substituting better material, would have been an incalculable gain to the academy, facilitating its discipline, increasing the value of its instruction, and giving to the army a larger number of competent officers.

The objection that the mode of making all appointments by open competitive examination will deprive the President and members of Congress of the opportunity of appointing the sons of meritorious officers, or poor, it may be, orphan boys of genius, is more plausible than real. That such appointments have been made, to the manifest advantage of the country, is certain. But we know not a single instance of such marked success as to attract investigation on the part of a cadet thus appointed, where the same youth would not have secured the appointment in open competition. But if he had failed, and the place had been filled by one better qualified, the country would have been no loser, and he would have suffered no injustice or neglect. We fear, from an abuse of this amiable motive of rewarding meritorious parents, and assisting the poor, that in some instances weak, ignorant, and incompetent persons are ppointed, as though the academy were a public charity school, or home for rphans; and not a special school for military instruction and training, for which the great object, in any mode of appointment, is to select those who will rofit most by its advantages, and do the country the greatest service after being hus educated at its expense.

To the objection that in these examinations, "the most forward boys will have he best chance, and such boys seldom make the best men," and that no amount f book knowledge can give assurance of the great military genius, "which nust be born and not made," we reply, that these objections apply just as for- ibly to any plan of nomination, and to every system of instruction. But we elieve that these examinations can be and will be so conducted as to distinguish what is precocious from what is the healthy development of the faculties; what s solid from what is showy in attainments; what is vigor, grasp and aptitude of nind, from what is mere memory and quickness, in competing candidates. All f these candidates must bring the testimonials of their former teachers, as to heir character, ability and attainments; must have reached the age of eighteen years; and will be called upon to exhibit, orally as well as in writing, their nowledge and opinions on subjects which require judgment, reflection, presence f mind and decision. If a young man of eighteen and upwards shows that e has done well what he had undertaken to do thus far in life, that he has pre- erved a sound constitution in vigorous health, has mastered the studies appro- riate to his age, is honest, diligent, thoughtful, teachable, courageous, courteous, nd ambitious of excellence generally, then the country has every assurance which can be given that on this basis of character, talents, attainments, and pplication, a solid fabric of military education can be reared, and that in the our of trial he will show not only courage to dare, but competence to devise, nfluence and command. In the responsibilities of such an hour will be found he fruitage of all his previous promise and preparation.

To the objection, "that a competitive examination must always result in the ccess of the best instructed, wholly irrespective of the capacity of the com- eting candidates, and the plan will thus secure for the country the services of ll mediocrity well instructed, and exclude genius without opportunities of velopment," we reply, that this result does occur now under the present stem, but that it need not, and never has been the result of such competitive mination properly conducted. The examination which we propose to have ugurated is, not to search simply or mainly for the results of memory or gence, but for "vigor and aptitude of mind," in reference to the special pur- es of this academy. The examination will be poorly conducted, and will ate here widely differently than elsewhere, if it does not only exclude in nce palpable incompetency, and ascertain beyond doubt the possession by he successful candidates of that knowledge which is the necessary basis nstrument of a special military training, but also seek, and give due credit e result, for the quick eye, the firm-set mouth, the vigor and elasticity of the rapid decision, the contempt of danger, the competency to influence ommand, and all the other marks of the incipient soldier and officer, as s the mathematical tastes and qualities of mind which indicate the suc- l engineer. Composed, as every examination commission might be, of at ne experienced officer of the United States army, of one member (past ent) of the academic board, of one officer of the State militia, as well as more experts in educational matters, the military qualities of body, er and mind, will be sought for as well as the mere results of memory, e and good opportunities of instruction, in the competing candidates.

e objection that candidates will make special preparation, and, in the ogy of the class-room, "cram for the occasion," we reply, to such prepar- l cramming as cover the whole ground of a good English education we o possible objection—the more of it the better. If the preparation is le and on the surface, we are sure that the ploughshare of interrogation, requiring precise answers, oral and written, will very soon expose its superficial and undigested character.

To the sifting out and selection by open competition might be added a period of probation for the successful candidates, making their first year's connexion with the academy, or in some preparatory school, a further test of capacity, preparation, and aptitude for a military career. No pains and no expense should be spared to exclude from the academy and the service incompetent, indifferent, and unteachable cadets and officers; such men are "cumberers of the ground," and no influence and inertia should be potent enough to resist the inevitable working of the principle of open competition, applied at frequent intervals, and at every stage of promotion, in getting rid of such cadets and officers. The disasters of this war are attributable to the want of this test vigorously applied.

The fact that such a public examination is to be held from year to year, and that the educational privilege of this academy, and immediate and prospective promotion in the army, are the prizes which await success, will in five years call forth more latent genius in the obscure corners and poor families of a State than has ever been sought out by the lantern of patronage, (which is now seldom carried beyond the family, or neighborhood, or party of the person having the nomination,) since the foundation of the academy. With the network of public and elementary schools woven by State legislation over all the land, with public schools of a higher grade, and special schools of science and the arts already established at short intervals, or which will be called into existence by the demand for a higher and different preparation from that now given, it may be safely said that no genius, likely to attract the attention of a member of Congress, will exist, which will not be developed under the same influences by which the "dull mediocrity" of the rest of the community will be educated. Once set in the path of instruction and development, real genius will assert its own claims to attention, and will, on a first or second trial, before any board of examiners, make its vigor, courage, and persistence felt. The result will be the same in this institution as in every really good public high school and free academy; all classes, as to wealth, occupation, religious and political affinities, will be represented; provided the regulations are judicious, and the examination practical and impartial.

This is the experience of the competitive principle in France, ever since it was inaugurated by Carnot in the Polytechnic School at Paris; and Napoleon extended its application to every public special school, and to promotion in every department of administration, civil as well as military. And where is there more general administrative ability, central and local? Where are abler or better trained officers, military and civil, to be found? Where does "well instructed mediocrity," no matter how well backed up by wealth, find less favor, or genius for organization and command, no matter how poor or unfriended, find such speedy and sure recognition?

The experience of England in the trial of the two principles of patronage and competitive examination for admission, not only to the military and naval schools, but to the East India and the civil service generally, is instructive, and especially on the points which we are now considering. Prior to the Crimean war, (which exposed the utter incompetency of a large number of officers who had obtained their military education and promotion by patronage and purchase,) admission to the Royal Military Academy at Woolwich was by nomination, and the age fixed by law was fourteen years.

The Secretary of War was satisfied by personal inquiry in 1855 that nothing could do so much to narrow and cramp the full development of a boy's mind as his long confinement from so early an age among lads having the same limited attainments, special studies and destination; that a majority of those admitted on nomination and through influential friends had only the minimum qualifications specified by law; that to most cadets the severer studies were irksome and imperfectly mastered, on account of immaturity of mind and imperfect preparation; that the certainty of promotion by influence and purchase, after obtaining the diploma of the academy, and not unfrequently without it, took away all stimulus for continued study; that resignations were common when the profession of arms ceased to be a pastime, or could be exchanged for something that paid better; and the service was incumbered by officers without large and trained capacity for command, although not deficient in courage and dash. Under these circumstances the Secretary of War advanced the minimum age of candidates from fourteen to eighteen years, removed all the general studies of the academy into the preparatory course, and opened the doors of admission to those only who could prove their title to enter by personal merit in a free competitive examination. The same principle was applied to appointments and promotion in the new regiments called for by the exigencies of the great war in which England found herself engaged.

Subjects, time, and places of examination were officially made known throughout the kingdom, and commissions to conduct the examinations were appointed, composed of men of good common sense, military officers, and eminent practical teachers and educators. The results, as stated in a debate in Parliament five years later, on extending this principle to all military and naval schools, and to all appointments and promotions in every department of the public service, were as follows: In the competitive examinations for admission to the Royal Military Academy, candidates from all classes of society appeared—sons of merchants, attorneys, clergymen, mechanics and noblemen, and among the successful competitors every class was represented. Among the number was the son of a mechanic in the arsenal at Woolwich, and the son of an earl, who was at the time a cabinet minister, the graduates of national schools, and the students of Eton, and other great public schools. The most successful candidates were between the ages of eighteen and nineteen, as is found to be the case in competitions for admission to the Polytechnic School of France. Out of 579 successful candidates for the latter, between 1854 and 1857, 450 were over eighteen years. But the most important result of the competitive examinations for Woolwich was the superior mental ability, the vigorous health, and the eagerness for study exhibited by the new classes, and the small number who have failed on account of ill health or incompetency. On this point, Mr. Edward Chadwick, in a report before the National Social Science Association at Cambridge, in 1862, says:

"Out of three hundred patronage-appointed cadets at the Royal Military Academy at Woolwich for officers of engineers and the artillery during the five years preceding the adoption of the principle of open competition for admission to the academy, there were fifty who were, after long and indulgent trial, and with a due regard to influential parents and patrons, dismissed for hopeless incapacity for the service of those scientific corps. During the five subsequent years, which have been years of the open competition principle, there has not been one dismissed for incapacity. Moreover, the general standard of capacity has been advanced. An eminent professor of this university, who has taught as well under the patronage as under the competitive system at that academy, declares that the quality of mind of the average of cadets has been improved by the competition—so much so, that he considers that the present average quality of mind of cadets there, though the sorts of attainment are different, has been brought up to the average of the first-classmen of this (Cambridge) University, which of itself is a great gain. Another result, the opposite to that which was confidently predicted by the opponents to the principle, has been that the average physical power or bodily strength, instead of being diminished, is advanced beyond the average of their predecessors."

The opening of the Royal Military School at Woolwich to competition, on the basis of a more advanced age, and more thorough general education, has not only drawn in pupils of higher average ability and attainments, but has enabled the authorities to extend the course of instruction. In this, the only safe way, they solved the problem which has tortured the ingenuity of the friends of our academy—of crowding new studies, acknowledged to be desirable, if not indispensable, into a course already too crowded for cadets so unequally, and many of them so imperfectly, prepared for the course as it is.

Another result of immense importance to the educational interests of Great Britain has followed the introduction of these open competitive examinations for appointments to the military and naval schools to the East India service, as well as to fill vacancies in the principal clerkships in the war, admiralty, ordnance and home departments of the government: a stimulus of the most healthy and powerful kind, worth more than millions of pecuniary endowment, has been given to all the great schools of the country, including the universities of England, Scotland, and Ireland. As soon as it was known that candidates, graduates of Trinity College, Dublin, had succeeded over competitors from Oxford and Edinburg in obtaining valuable appointments in the East India service, the professors in the latter universities began to look to their laurels. As soon as it was known to the master of any important school that some of his leading pupils might compete in these examinations, and that his own reputation as a teacher depended in a measure on the success or failure of these pupils, he had a new motive to impart the most vigorous and thorough training to his whole school. The success of candidates, who had never seen the inside of a government military school, in open competition for appointments to the artillery and engineer corps, in the new regiments raised in 1855, over those who hold the diplomas of the Royal Military Academy, was one of the reasons which led to a thorough revision of the whole system of military education.

These results, imperfectly presented here, will, the visitors believe, be realized from the changes which they now suggest in the requirements as to age, attainments, capacity, and aptitude, and especially in the mode of ascertaining these qualifications, of candidates for appointments to the cadet corps of the United States army.

To the present low requirements and mode of selecting cadets do they attribute the hostility which they know exists to some extent against this academy in different parts of the country. The charges of personal and political favoritism in making nominations, and the absence of reasonable search among all the youth of a district for the best qualified in natural endowments and acquired knowledge, irrespective of the poverty, or wealth, or occupation, or family, or party relations of the parents or guardians, we are forced to believe, in too many instances, to be well founded. To these hasty and injudicious nominations do we attribute the bitter disappointments of so many individuals and families, caused by the numerous failures to pass the almost formal entrance examinations in reading, spelling, penmanship, and elementary operations of arithmetic; or if admitted, to maintain a respectable standing in conduct and studies during their first year's connexion with the institution. To this inequality of preparation and maturity of mind on entrance do we attribute the astonishing disparity of capacity and attainments in the members of the same class, and the very large proportion of all who are admitted who fail to graduate in very high standing as men of science or military promise. To this want of preparatory knowledge, maturity of mind, and taste for mathematical and military studies do we attribute most of the difficulties of internal administration and class-room instruction. So long as the cadet is a boy, or if full grown in body, a youth with only boyish tastes, and without scholarly and soldierly aspirations—so long as not a few are in the academy, not because they sought its privileges from an inward and irrepressible impulse to military career, but for the eclat of a military position, to be resigned when such position involves sacrifices—*so long* will the admission of each new class, and especially the period of encampment, be signalized not only by boyish pranks, but by personal outrages on unoffending members of the same corps, which we had supposed to belong to the dark ages of collegiate institutions, when boyish inmates were congregated in large numbers away from the restraints of family discipline; so long will the time, skill, and patience of able professors, which should be devoted to the elucidation of difficult scientific principles, and their applications to military art, be engrossed in supplying the defects of an elementary education which should have been obtained by the cadet as well or better at home; so long will the severe mathematical studies and their special applications, difficult enough to task a well-disciplined mind even with the preparation provided in a thorough knowledge of arithmetic, algebra, and geometry, be irksome in the extreme, and be never mastered to any useful purpose to the army of the United States by more than one-half of the graduates of the academy; *so long* will the country be disappointed in the subsequent career of many graduates, for whose military instruction and training all these appropriate and costly preparations have been made.

In view of these and other considerations, the board of visitors unanimously recommend that the law and regulations relating to the Military Academy be so modified as to provide as follows:

I. The cadet corps of the army of the United States shall consist of four hundred members, to which each State and Territory shall be entitled to a number equal to its representation in the Congress of the United States, and the remainder shall be designated by the President from the country at large, including the District of Columbia; and he shall also fill in the same way any vacancy which for any cause may remain unfilled for three months after the annual examination in each year.

II. No person shall be appointed to the cadet corps until he has been found qualified in the particulars designated by law, after a public examination, conducted in such places, at such times, and in such manner as Congress shall prescribe; from which examination no person resident of that portion of the country for which the same is held shall be excluded who shall present credentials from the teacher or teachers whom he had last attended that he is over seventeen and under twenty-one years of age, of unblemished moral character and personal habits, of good physical strength and constitution, and has given evidence of aptitude and vigor of mind for the studies and duties of a military career. The examiners shall make return under oath to the Secretary of War of the persons so presenting themselves, examined, and found qualified, arranged in the order of merit, specifying the residence and school or schools which they have attended in the two years previous, and the degree of merit exhibited in each subject of the examination. And all appointments to fill vacancies for any State or Territory, or for the country at large, shall be made from the returns and in the order of merit as assigned by the examiners, until the same shall be revised by regulations of the department.

III. No person shall be returned to the Secretary of War as a suitable candidate of admission to the cadet corps unless he—

1. Shall be over seventeen and under twenty-one years of age;

2. Shall possess an unblemished moral character and correct personal habits;

3. Shall be in good health, and in no way incapacitated, by want of vigor and elasticity of physical constitution, for military service;

4. Shall possess vigor and aptitude of mind for the studies of the Military Academy, and shall give evidence, oral and written, of a good English education, which, in view of the wide-spread facilities of instruction in public and private schools, might very properly embrace—

(a.) The correct use of the English language, in speaking, reading, and writing the same;

(b.) Penmanship, bookkeeping, and elementary drawing;

(c.) The ability to perform with facility and accuracy the various operations of arithmetic;

(d.) The elementary principles of algebra and geometry;

(e.) A thorough knowledge of American geography and history, and the leading features of the Constitution of the United States, and of the State of his residence;

(f.) Or as much of the subjects above specified as shall be deemed indispensable to the immediate and profitable attention of the cadets on their admission to the special studies and occupations of a military school;

5. Shall make a written declaration of his desire to obtain admission to the cadet corps for the purpose of qualifying himself for the military service of the United States, which service he assumes from the date of his appointment as cadet, to continue in the same for a period of at least sixteen years, bearing true faith and allegiance to the Constitution and government of the United States, against all enemies, foreign and domestic, and paramount to all obligations to any State government, authority, or constitution.

All of which is respectfully submitted.

OLIVER S. MUNSELL, *Illinois.*
BIRDSEY G. NORTHROP, *President, Massachusetts.*
THOMAS M. ALLEN, *Secretary, Missouri.*
HENRY BARNARD, *Connecticut.*
SAMUEL W. BOSTWICK, *Ohio.*
THOMAS BRAINARD, *Pennsylvania.*
CYRUS BRYANT, *Illinois.*
A. W. CAMPBELL, *West Virginia.*
R. W. EMERSON, *Massachusetts.*
ORAN FAVILLE, *Iowa.*
JOHN H. GOODENOW, *Maine.*
P. D. GURLEY, *District of Columbia.*
OLIVER P. HUBBARD, *New Hampshire.*
EDWARD MAYNARD, *District of Columbia.*
HENRY S. RANDALL, *New York.*
WILLIAM H. RUSSELL, *Connecticut.*
WILLIAM A. RUST, *Maine.*
ALBERT SMITH, *New Hampshire.*

APPENDIX.

Documents referred to in report of visitors of the Military Academy for 1863.

A.—Statement exhibiting the condition in life of the parents of the cadets of the United States Military Academy at West Point, from 1842 to 1863, inclusive.

B.—Statement showing the number of cadets actually admitted into the United States Military Academy from its origin in March, 1802, to October, 1863, with the States and Territories whence appointed.

C.—Statement exhibiting the actual number of cadets who have graduated at the Military Academy from its origin in 1802, to September, 1863, and the States and Territories whence appointed.

D.—Table exhibiting the total number of cadets admitted, graduated, and failed to graduate from death, incompetency, and other causes, from each State and Territory, together with the proportion of graduates and failures to the whole number admitted, the number remaining in the academy in July, 1863, and the number to which each State and Territory is entitled under the census of 1860.

E.—Statement of the conditions of admission as to age, physical condition, and knowledge, and mode of making appointments, to several of the principal military schools in Europe.

A.

Statement exhibiting the condition in life of the parents of the cadets of the United States Military Academy at West Point, New York, for the last twenty-two years, from 1842 to 1863, inclusive.

	1842.	1843.	1844.	1845.	1846.	1847.	1848.	1849.	1850.	1851.	1852.	1853.	1854.	1855.	1856.	1857.	1858.	1859.	1860.	1861.	1862.	1863.
Fathers are or were farmers or planters	59	61	61	68	72	67	69	75	70	63	67	58	66	62	60	52	48	57	65	29	33	38
Fathers are or were mechanics	14	12	15	22	22	25	22	21	16	14	14	13	12	17	26	22	15	30	12	13	8	12
Fathers are or were judges or lawyers	27	25	30	35	33	30	29	23	34	33	34	35	36	26	25	29	32	32	36	23	35	39
Fathers are or were merchants	18	15	23	37	29	29	31	38	36	38	35	35	39	40	30	26	41	28	28	23	24	29
Fathers are or were boarding-house or hotel keepers	5	2	4	3	7	6	4	2	2	2	3	3	5	2	2	1	.....	.....	3	4	4	5
Fathers are or were physicians	12	15	15	13	21	19	21	21	18	14	14	13	9	8	9	17	16	10	18	10	13	18
Fathers are or were in the army, navy, or marine corps	14	16	16	13	11	13	17	17	18	22	24	27	28	22	20	20	26	29	33	23	25	33
Fathers are or were clergymen	4	6	6	6	5	3	3	4	4	4	3	5	4	6	5	4	5	6	7	7	8	11
Fathers are or were in the civil employment of the general or State government	5	15	16	9	5	2	3	7	7	8	10	11	14	13	13	7	31	29	18	8	11	14
Miscellaneous: as bank officers, editors, professors, masters of vessels, &c.	15	11	15	23	35	36	41	24	32	39	30	26	14	25	13	13	12	6	37	44	39	42
Occupation not stated, or no occupation	48	34	23	17	1	2	2	8	7	11	13	7	10	19	15	20	25	39	22	18	18	19
Total	221	212	224	236	241	232	242	240	244	239	247	232	237	239	223	221	251	266	279	202	218	260
Of these numbers there are without fathers living	26	57	44	48	42	41	34	48	40	45	36	35	29	33	33	24	46	33	42	25	25	36
Without fathers or mothers living	22	16	18	15	21	20	18	16	26	17	19	17	15	9	6	7	7	8	10	11	9	7
Total orphans	48	73	62	63	63	61	52	64	66	62	55	52	44	42	39	31	53	41	52	36	34	42
Of these numbers the parents are stated to be in moderate circumstances	.....	156	150	164	192	182	193	203	215	207	218	205	206	215	196	195	216	218	239	184	199	232
Of these numbers the parents are stated to be in reduced circumstances	182	26	26	36	35	38	40	29	25	16	9	8	8	7	8	8	8	7	6	2	5	5
Of these numbers the parents are stated to be in indigent circumstances	.....	6	8	8	8	8	4	4	2	2	.....	1	1	1	1	1	1	.....	.....	.....	1	5
Of these numbers the parents are stated to be in independent circumstances	.....	6	10	12	6	4	5	4	2	14	20	22	22	16	18	17	26	41	34	16	12	17
Of these numbers the parents are stated to be in unknown circumstances	39	18	19	16	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	1	1
Total	221	212	224	236	241	232	242	240	244	239	247	232	237	239	223	221	251	266	279	202	218	260

NOTE.—Of the ninety-seven cadets admitted to October 19, 1863, as given in the table on page 97, forty-six were appointed from the United States volunteers engaged in the war who held the following rank: one captain, five first lieutenants, three second lieutenants, ten non-commissioned officers, twenty privates, one musician, and six clerks from military departments.

B.

Statement showing the number of cadets actually admitted into the United States Military Academy from its origin, March 16, 1802, *to October* 19, 1863.

Year of admission.	Maine.	New Hampshire.	Vermont.	Massachusetts.	Rhode Island.	Connecticut.	New York.	New Jersey.	Pennsylvania.	Delaware.	Maryland.	Virginia.	West Virginia.	North Carolina.	South Carolina.	Georgia.	Alabama.	Mississippi.	Louisiana.	Ohio.	Kentucky.	Tennessee.	Indiana.	Illinois.	Missouri.	Arkansas.	Michigan.	Florida.	Texas.	Iowa.	Wisconsin.	California.	Minnesota.	Oregon.	New Mexico.	Utah.	Washington Ter.	Nebraska Ter.	Kansas.	Dakota Ter.	Colorado Ter.	Nevada Ter.	Dist. of Columbia.	At large.	Unknown.	Total.
1802				5		1	1				1	1													1																					10
1803			3				1	1						1											1																			2		9
1804			1				1		1																5																				1	9
1805			3				2		2																1																				1	9
1806			5	1						1	1																																1			9
1807		2	5	2		2	2																																						4	17
1808	1	1	8	2		4	10		2		1	2																																	11	42
1809	1			2				2																																					4	10
1810							1								1																															2
1811																																														
1812	1	1	1	1			3																1																				2			10
1813		1	3	11		1	30		5		5	6		4	2	2				2	1		2																				12		1	88
1814			4	14	1		48	4	9	2	21	22		3		1				4	5		1				1				5												6			146
1815			1	1		1	14	1	4	4	6	5		3	4	1				1	1	1		1																			12			61
1816		2		1		2	1	1	1	1	1	9		2	4	2				2		2																					1	2		34
1917		3	3	6		2	5	1	3	1	3	4			8	1	1		1	2	3	5	1																				2			55
1818		4	4	11	1	6	22	3	13		6	17		5	5	1			1	3	5	3									1												5			116
1819	4	1	5	4	1	5	11	6	9	3	3	10		4	5	1		1		1	5		1		1		2																3			86
1820	3	3	1	6	1	1	9		11		4	4		3	3	1		2	1	1	4	2		1	2																		4			67
1821		1		5		1	16	4	7	2	5	8		5	5	5				1	6	3	1																				2			77
1822	3	4	5	6	1	4	10	1	14	1	4	12		7	9	4	2		1	3	3	4	1		2		1	2															2			106
1823	2		3	7	1	3	13	2	9	1	4	13		9	3	3			3	8	8	4		1	4		2																1	1	1	106
1824	5	2	1	5	2	4	8	3	7	1	3	2		1	2	3	3	2	2	5	6	5	4	2																			1			79
1825	2	2	1	6	1	3	15	2	12	1	7	7		6	6	5	2	1	1	5	7	3	1	1	2		1																3			103
1826	2	3	1	2	4	1	12	3	8	2	6	11		5	1	4	1		4	3	3	7	2	1	1			1															3			91
1827	1	3	3	3	1		18	1	11	1	3	15		9	4	1	1		2	7	5	2		1	1	1	1	1															1			97
1828	5	4	2	5	1	5	11	2	10	1	3	14		6	4	2	3	2		4	8	5	3	1		1	1	1															3			107
1829	1	3	4	10	1	4	16	2	13	1	2	14		5	6	4	3		3	4	3	2	1		3			1															3			109
1830	1	2	1	4	2	1	14	2	8		5	18		5	3	5	1		1	3	6	5	3	1	1	1		1															5			99
1831	4	1	1	5	2	2	18	2	6	2	7	8		6	4	4	1	1	1	4	6	3			1																		3			92
1832	3	3	1	4	2	2	11	4	12	2	3	10		7	5	2	3	1	1	2	5	4	2	3			2	1															3	3		101
1833	1	2	1	8		6	9	2	8	1	6	17		5	1	3		3	4	4	4	6	3	2	2		1	2															5			106
1834		1	2	1		1	7	1	5	2	4	4		2	4	4	4	2	1	3	3	5	1	2	1		1																2			63

1835	5	1	2	4		1	13	1	10		2	1		4	3		1		2	5	3	7	3	1																			4		1	74
1836	4	4	1	2	3	2	19	4	8		2	10		5	3	5	2	1	1	7	3	5	1	1				1															3			97
1837	2	1		5		3	17	3	13	1	6	14		6	6	6	2			6	4	3	3	2		1	1				1												4	7		117
1838	1	1	2	2	1	2	9		8	1	3	10		4	3	6	3		2	7	6	6	2	1	1		1																3	26		111
1839	2	1	2	2	1	2	12	4	7	1	1	2		1	2	2	3			3	6	1	2		1	1	1	1		1													1	13		76
1840	4			6	2		16	1	7	1	2	5		7	4	4		1	1	6	5	5	1																				1	5		84
1841	3	2	2	7		4	12		11		3	10		3	4	5	1		2	8	4	7	3	1		1		1															3	17		114
1842	2	1	1	7	1	1	12	3	11		4	9		4	6	5	3	1		4	4	4	2	3		1																	2	18		109
1843		1	1	1			5		5	1	1			1	3		3	1	2	6		3	4	3	2		3			1	1													12		60
1844	1	2		2	1	1	7	2	7		2	3		4	2	1	4	1	2	5	3	3	3	3	2	1	2																	11		75
1845	3	1	1	3		3	12	1	6		1	6		1	2	2	3	2	2	7	5	3	2	1	2		1	1																10		81
1846	3	1	2	5	1	2	14	1	10	1	4	7		5	1	5	4	2	4	4	4	5	2	2	1				2														1	10		103
1847	3	1	2	2		1	10	1	8		1	5		3	3		1		1	7	3	3	3	2	1		1			2													1	9		74
1848	1	1		1	1	1	9	4	7		3	3		3	3	3	2	2		10	3	3	2	4	2	1	1				1													10		81
1849	3	1	1	3		2	11	3	7	1		8		1	1	3	3	3		8	1	3	3	3	2	1	1	1	2	1	2													10		89
1850	3	2	3	4	1		8	1	11		2	7		4	4	4	2	2	3	2	5	3	3	2							2	1	1											10		90
1851	1		1	5		1	13		8	1	1	3		3		1	1	1	2	5	3	3	2	3		1																	1	11		71
1852	2				1	1	13	3	5		3	3		3	1		2	1	2	7	5	7	5	1	2		3			1		1				1							1	16		90
1853	2	2		3		3	8	3	4		3	5		3	2	5	4		1	6	4	2	3	1	3		1	1	1	2					1									10		83
1854	3		2	5	1	1	10	2	10		4	5		2	3	3	4	3	2	6	1	6	2	4	3	2	1		1		3	1	1	1		1								10		103
1855			1	3	2	1	11	1	11	1	1	2		3	2	1		1	1	7	1		3	7	1		1	1	1		1	2			1		1		1					10		80
1856	2	1	1	2			11	2	8		1	3			1	1	1	1	2	4	3	4	3		2	1	2	1	1	1	2			1									1	10		73
1857	3	2		2	1	2	6	1	8		1	7		2	2	3	2	3	2	5	7	4	1	1	2		1		1	1		1			1									10		82
1858	2			5		1	5	2	3		2	4		4	2	5	2	1	1	9	1	4	6	1				1		1		1	1					1						10		75
1859			1	1		1	4	2	8		1	2		2	1	2	2	2	2	4	3	4	3	2									1				1		1					10		60
1860	2		1	3	1		10	1	9	1	1	2		2	2		3	2	1	4	2	2	2	7	2	1										1								10		72
1861	4	3	1	4	1	2	14	2	13	1	3	2					1			8	1		6	3	3		3			1	3		1							1			1	26		108
1862	1		1	3	1	1	11	1	6		4	1								7	7		4	4	5					2		2	1		1			1	1		1		1	13		81
1863			2	2		1	8	2	5		3	7	1	7	4	8	4	5	2	4	2	7	2	1	1	2		1	2			1		1	1							1		10		97
Total	102	78	104	232	42	102	650	101	424	41	179	379	1	190	159	139	88	51	67	248	196	178	109	81	67	17	38	20	11	14	17	10	6	3	5	3	2	2	3	1	1	1	113	330	26	4,626

NOTE.—Owing to the destruction of the records by fire in 1838, the States in which some of the cadets resided previous to that event are given, though it is believed they were appointed at large. The President of the United States having determined late in August, 1863, to fill all the existing vacancies from the seceded States, there were in the fourth class, numbering ninety-seven, on the 19th of October, forty-eight thus appointed. Ten cadets similarly appointed had not, on that date, been examined for admission into the Military Academy.

C.

The following statement exhibits the actual number of cadets who have graduated at the Military Academy from its origin to the present date, with the States and Territories whence appointed.

Year of graduation.	Maine.	New Hampshire.	Vermont.	Massachusetts.	Rhode Island.	Connecticut.	New York.	New Jersey.	Pennsylvania.	Delaware.	Maryland.	Virginia.	North Carolina.	South Carolina.	Georgia.	Alabama.	Mississippi.	Louisiana.	Ohio.	Indiana.	Illinois.	Kentucky.	Tennessee.	Arkansas.	Missouri.	Michigan.	Wisconsin.	Dist. of Columbia.	Florida.	At large.	Iowa.	Texas.	Utah Territory.	Minnesota.	Washington Ter.	Oregon.	New Mexico Ter.	California.	Nebraska Ter.	Aggregate.
1802				1							1																													2
1803				1			1					1																												3
1804			1	1																																				2
1805						1	1						1																											3
1806			5	1			2	1	1					1											4															15
1807			4				1																																	5
1808		2	6	3		1	1			1															1															15
1809			2	1			3				1																													7
1811	1	1	3	1		2	5	1	2		1	1																1												19
1812	1		3	2		3	4	1	1			1		1														1												18
1813							1																																	1
1814		1	2	5		1	9		3			1	1							1		1						5												30
1815			1	5			14		1		4	2		2	3				4									4												40
1817	1		1		1		4		1			8								1		1						1												19
1818			1	2		1	3	1	2	2	5	3	1									1						1												23
1819		1	3	4		1	6	2		1	3	2	1	1				1			1	1						1												29
1820				1			11	1			5	3	3	1					1				2					2												30
1821		1		4		1	6		2		2	1		3	1				1	1			1																	24
1822		2	3	2	1	5	6	2	6			5	1	1		1			2			1	1					1												40
1823		1	3	4	1	3	5	2	3	2			3	1			1					2	1			1		2												35
1824	1	3		5			6		4		3	2		2			1	1				2	1																	31
1825		1	1	2		1	9	3	5		3	3	2	2	2							2	1																	37
1826	1	2	2	1	1		2	1	7	1	2	8	3	2	1			1		1		1	1		1			1	1											41
1827			3	4			6		4		2	4	3	2		1			3			4				1		1												38
1828	3	1	2	4		5	2	1	1		1	1		1		1	1	1	2	2	1		2		1															33
1829	2	1	1	5		3	7	3	4		2	2	2	3	3				4	1		2						1												46
1830	2		1	1	2		6	1	4	1	4	2	2	1	1			1	1	1	1	4	2		1			3												42
1831	1	1			1		8	2	4	1	3	2	2	1	1				3			2	1																	33
1832	3	3	1	2	1	1	6	1	5		2	4	1	1		1	1		3		1	3	3			1		1												45
1833		2	1	7		2	5	1	5	1	1	5	1	2	1	2				1		1	2		1			2												43
1834		1	2	1		1	7		6		1	5		1	1				1	1		4	1		1			1	1											36
1835	4	1	1	4			11	2	4	1	2	4	3	2	3	1			4			4	1					3		1										56
1836	2	3	1	1	3	1	10	3	6	1	2	5	2	2						1		2	1					1		2										49

1837	1	1	1	6		2	4	3	5	2	4	6	2		2	1				2	1	1	1		1	1		3												50
1838			2			1	7		4		1	3	1	2	2	2	2	2	3		1	3	2		1	1		1		4										45
1839	2	1	1	2		1	6		5		1	1	1	1					3	1		3	1					1												31
1840	3	1		2			8	1	3			4	3					1	6				3					2	1	4										42
1841	1	1	1	5		2	6		7	1	4	7	1	3					2	3	2	1	1	1		1				2										52
1842	1	1	1	2	2		7	1	5		2	7	1	3	1	2	1	1	4	1	1	3	1					2		6										56
1843	2	1	2			1	7	2	4			3							3	2		2	1		1	1				6	1									39
1844		1		1	1	1	2		3	1	2	1	1						2			4	1	1				2		1										25
1845	3		1	2		1	8		1			2	1		2			1	4	2		3	1						1	8										41
1846	2	1	2	4	1	1	10	1	8		3	5	2	1	4						1	1	3					1		8										59
1847							5		3			2	1	2					8	4	2				1	1				8	1									38
1848	1	1					5	3	5			1	1	3		2			1	1	2		2	1		1	1			7										38
1849		1	1	2		2	5		3			5			2		2		4	2		2	2		1				1	8										43
1850	3	1	1	3	1		7		6		3	2	2	1	2			2			1	2	2							5										44
1851	1		1	3		1	6		5			2	3			1		1	2	2	1	2	3					1		6	1									42
1852					1	1	7	2	4		2		2			2	1		6	2	1	2	1		1	2				6										43
1853	1	1		2		1	5	1	3		1	5		2	3	1			8	3	2	1	2		2				1	5	1	1								52
1854	2	1	2	1	1		4	1	5			4	2	3	2	2	2	1	1	1			1				3			6		1								46
1855		1	1	3			7		8	1			2		1			1	2	1	2									3										34
1856	1						8	1	3			2	1			1	1		7	3		4	2		1	2		1		10										48
1857	2	2		2		2	3	1	1			3		2	4	2			2	1	1	3	1		2					3	1	1								39
1858	1			4		1	1	1	1		2		2	1	2	1	1		2	1		1	1							3			1							27
1859			1				4		4		1	1				1			2		1		1			1	1			3				1						22
1860	1		1	3	1		7	1	3	1	1		2	2		1			3	1	6			1						5					1					41
1861	3	3	1	3	1	2	15	2	10		1	1							5	1	1	4	1	1	2	3	2	1		14	1					1	1			80
1862	1			3		1	3		2										6	1		1	1		1					5				1				1	1	28
1863			1	2		1	4	1	5		1								3	2		2						2							1					25
Total	54	47	75	131	20	55	329	51	197	18	79	142	63	59	44	26	14	15	118	48	30	83	56	5	24	17	7	50	6	139	6	3	1	2	2	1	1	1	1	2,020

D.

Statement exhibiting the whole number of cadets admitted to the Military Academy from each State and Territory, and the whole number graduated.

State and Territory.	Admitted.		Graduated.			Failed to graduate.		Remain.		Entitled by Census of 1860.
	From	Total.	From	Total.	Pr. cent.	No.	Per cent.	No.	Pr. ct.	
Alabama	1817	88	1822	26	.295	61	.693	1	.012	7
Arkansas	1827	17	1841	5	.294	......	.705	......	......	2
California	1850	10	1862	1	.100	6	.600	3	.300	3
Connecticut	1802	102	1805	55	.539	43	.422	4	.039	4
Delaware	1806	41	1808	18	.439	22	.539	1	.022	1
Florida	1822	20	1826	6	.300	14	.700	......	......	1
Georgia	1813	139	1815	44	.329	95	.670	......	......	8
Illinois	1815	81	1819	30	.370	42	.519	9	.111	13
Indiana	1812	109	1814	48	.440	52	.477	9	.083	11
Iowa	1839	14	1843	6	.428	6	.428	2	.144	6
Kansas	1855	3	......	......	......	2	.667	1	.333	1
Kentucky	1813	196	1819	83	.423	105	.531	8	.046	9
Louisiana	1817	67	1819	15	.223	51	.761	1	.016	4
Maine	1808	102	1811	54	.529	43	.422	5	.049	5
Maryland	1802	179	1802	79	.441	95	.537	5	.022	5
Massachusetts	1802	232	1802	131	.565	91	.392	10	.043	10
Michigan	1814	38	1823	17	.447	18	.474	3	.079	6
Minnesota	1850	6	1859	2	.333	2	.333	2	.333	2
Mississippi	1819	51	1823	14	.274	37	.725	......	......	5
Missouri	1802	67	1806	24	.358	37	.552	6	.090	9
New Hampshire	1817	78	1808	47	.602	28	.359	3	.039	3
New Jersey	1803	101	1806	51	.504	45	.446	5	.050	5
New York	1802	650	1803	329	.506	289	.444	32	.050	31
North Carolina	1803	190	1805	63	.331	127	.668	......	......	8
Ohio	1813	243	1815	118	.485	105	.432	20	.083	19
Oregon	1854	3	1861	1	.333	1	.333	1	.333	1
Pennsylvania	1804	424	1806	197	.464	203	.479	24	.057	24
Rhode Island	1814	42	1817	20	.476	20	.476	2	.048	2
South Carolina	1809	159	1806	59	.371	100	.628	......	......	6
Tennessee	1815	178	1820	56	.314	122	.686	......	......	10
Texas	1840	11	1853	3	.272	8	.727	......	......	2
Vermont	1803	104	1804	75	.721	26	.250	3	.029	3
Virginia	1802	379	1803	142	.374	233	.615	4	.011	13
West Virginia	1863	1	......	......	......	......	......	1	1.000	1
Wisconsin	1837	17	1848	7	.411	7	.412	3	.177	6
District of Columbia	1806	113	1811	50	.443	62	.549	1	.008	1
New Mexico Territory	1852	5	1861	1	.200	3	.600	1	.200	1
Utah Territory	1853	3	1858	1	.333	1	.333	1	.333	1
Washington Territory	1855	2	1861	2	.100	......	......	......	......	1
Nebraska Territory	1858	2	1862	1	.500	......	......	1	.500	1
Dakota Territory	1861	1	......	......	......	......	......	1	1.000	1
Colorado Territory	1863	1	......	......	......	......	......	1	1.000	1
Nevada Territory	1863	1	......	......	......	......	......	1	1.000	40
At large	1837	330	......	139	.421	156	.473	35	.106	......
Unknown	1803	26	......	......	......	......	......	......	......	......
Total	......	4,626	......	2,020	......	.210	......	......	......	294

NOTE.—The above table gives results condensed from those which precede it. There is a trifling difference which arises from there having been admitted since 1803 twenty-six cadets from State or Territory unknown. How many of these were subsequently included in lists of those who graduated or failed we have no means of ascertaining.

REPORT OF THE CHIEF OF ORDNANCE.

ORDNANCE OFFICE, WAR DEPARTMENT,
Washington, October 27, 1863.

SIR : I have the honor to submit the following report of the principal operations of the Ordnance department during the last fiscal year, together with such remarks and suggestions as the magnitude of the interests involved seems to require.

The fiscal means of the department since the last report, in November, 1862, have been as follows, viz :

Amount as per last report undrawn from the treasury on June 30, 1862	$2,300,492 25
In the government depositories to the credit of disbursing officers, same date	1,318,241 47
Amount of appropriations from that date to the end of the last fiscal year, including the fixed annual appropriation for arming and equipping the militia	72,066,888 00
Received, since June 30, 1862, on account of damages to arms in hands of troops, from sales of arms to officers, from sales of condemned stores, and from all other sources not before mentioned	146,152 84
Total	75,831,774 56

Amount of expenditures since June 30, 1862	$42,313,630 21
In the government depositories to the credit of disbursing officers, June 30, 1863	2,505,107 81
Remaining in the treasury, same date	31,013,036 54
Total	75,831,774 56

The estimates for the next fiscal year have been prepared with care, and will not admit of curtailment. They are based not only on the probable wants of the army during that period, but embrace also the cost of fabrication of all the heavy guns and carriages which the united industrial forces of the large foundries and of our arsenals can supply for the better arming of the sea-coast and frontier forts and batteries. Our supply of guns and carriages for these places is now far behind what it should be; and it is not only desirable, but of the utmost importance, that ample means should be placed at the disposal of the department to put them in a complete state of defence as speedily as possible.

The principal articles of military supplies which it is the duty of this department to provide, and which it has procured by fabrication and purchase, and which it has supplied to the army during the year ending June 30, 1863, and also the number or quantity of each which remained on hand at the arsenals and depots at that date, are stated in detail in the accompanying statements—1 to 7.

From these it will be seen that the principal articles procured were :

1,126 field cannon of different calibres.
335 siege cannon of different calibres.
116 sea-coast cannon of different calibres.

Cannon balls, shells, and other projectiles.

1,099,622 for field artillery service.
106,426 for siege artillery service.
45,947 for sea-coast forts.

965	artillery carriages for field service.
261	artillery carriages for siege service.
307	artillery carriages for sea-coast forts.
99	mortar beds.
871	caissons, travelling forges, and battery wagons.
1, 082, 841	small arms for foot soldiers.
282, 389	small arms for mounted troops.
901, 667	sets of infantry accoutrements.
18, 009	sets of cavalry accoutrements.
94, 639	sets of horse equipments.
3, 281	sets of artillery harness for two horses, each.
5, 764, 768	pounds of gunpowder.
48, 719, 862	pounds of lead and lead bullets.
1, 435, 046	rounds of ammunition for artillery.
259, 022, 216	rounds of ammunition for small arms.
347, 276, 400	percussion caps.
3, 925, 369	friction primers.

In addition to the foregoing principal articles, finished complete, an immense amount of material has been prepared and advanced to different stages towards completion at the arsenals, embracing iron and wood work for artillery carriages and implements, projectiles and ammunition of all kinds for cannon, bullets for small arm cartridges, leather work for harness, equipments, and accoutrements. A large number of artillery carriages and small arms of every description, which had been disabled in service, have been repaired at the arsenals, and refitted for service in the field.

The principal articles supplied to the army during the same period were:

1, 108	field cannon of different calibres.
288	siege cannon of different calibres.
41	sea-coast cannon of different calibres.

Cannon balls, shells, and other projectiles.

699, 217	for field artillery service.
156, 000	for siege artillery service.
84, 530	for sea-coast forts.
1, 125	artillery carriages for field service.
340	artillery carriages for siege service.
753	artillery carriages for sea-coast forts.
207	mortar beds.
1, 040	caissons, travelling forges, and battery wagons.
582, 736	small arms for foot soldiers.
291, 141	small arms for mounted troops.
899, 006	sets of infantry accoutrements.
92, 381	sets of cavalry accoutrements.
109, 600	sets of horse equipments.
6, 002	sets of artillery harness for two horses, each.
5, 337, 765	pounds of gunpowder.
31, 139, 102	pounds of lead and lead bullets.
1, 089, 863	rounds of ammunition for artillery.
165, 777, 604	rounds of ammunition for small arms.
373, 192, 870	percussion caps.
3, 719, 740	friction primers.

Also large supplies of tools, materials, and spare parts for repairing and replacing in the field worn or lost parts of artillery carriages, small arms, accoutrements and equipments of all kinds.

The stock of such principal articles remaining on hand in store at the arsenals and depots at the close of the fiscal year, June 30, 1863, were as follows, viz:

484 field cannon of different calibres.
249 siege cannon of different calibres.
679 sea-coast cannon of different calibres.

Cannon balls, shells, and other projectiles.

474, 515 for field artillery service.
234, 893 for siege artillery service.
471, 341 for sea-coast forts.
359 artillery carriages for field service.
44 artillery carriages for siege service.
622 artillery carriages for sea-coast forts.
230 mortar beds.
517 caissons, travelling forges and battery wagons.
836, 001 small arms for foot troops.
124, 897 small arms for mounted troops.
162, 010 sets of infantry accoutrements.
2, 498 sets of cavalry accoutrements.
5, 562 sets of horse equipments.
1, 767 sets of artillery harness for two horses, each.
1, 463, 874 pounds of gunpowder.
8, 155, 079 pounds of saltpetre.
23, 024, 025 pounds of lead and lead bullets.
378, 584, 104 rounds of ammunition for small arms.
2, 274, 490 rounds of ammunition for artillery.
715, 036, 470 percussion caps.
6, 082, 505 friction primers.

Although this department has, as shown by the foregoing figures, procured by manufacture and purchase an immense quantity of supplies, the whole course of the war, but particularly of the past year, has most forcibly shown the bad policy, indeed, danger, of relying too much on private parties, no matter how large their resources, for the principal munitions of war. It is impossible for them to control fluctuations of the market in labor and material; and no private establishment can afford to keep large stocks of ordnance stores on hand, such as are required by the government to meet its sudden wants. This can only be done by the government itself; and to be able to meet all emergencies, this department should have under its own control ample means not only to supply, but also for manufacturing all the principal munitions in its own shops. Warned by repeated lessons, energetic measures are now being taken to enlarge several of the principal arsenals, namely: Watertown, Watervliet, Allegheny, St. Louis, Washington, and Benicia, California, so that the evils alluded to may be in future avoided.

During the past year large supplies of foreign manufactures have been procured, but much less than during the preceding year, owing to the increased development of our own resources. It is the intention of the department to procure, if possible, in this country every article required, whether in the crude or manufactured state, and, with the exception of such articles as sulphur and saltpetre, there is no reason to doubt that this plan can be fully carried out; thus securing to our own people the benefit of our large expenditures, and rendering us independent of foreign nations.

The supply of saltpetre, reported as on hand at the date of the last annual report, remains intact, the department having found no difficulty in procuring ample supplies of gunpowder without having recourse to this reserve stock; and, at the same time, a large addition has been made to our supply of sulphur, rendering it ample for present wants.

As regards small arms, we may now consider ourselves perfectly independent of foreign aid. The supply from the Springfield armory alone for the coming year is estimated at not less than 250,000, while from private parties there will probably be received at least 250,000 more. Of carbines, for cavalry, the present capacity of established manufactories, under contract to the department, is not less than 100,000 annually, and of pistols not less than 300,000.

The wisdom of the measures adopted by the War Department in September, 1862, for the purpose of procuring a supply of iron suitable for the manufacture of muskets and other fire-arms, the product of our own manufactories, avoiding the necessity of resorting to a foreign market, has been fully demonstrated. Iron of a quality fully equal to the celebrated irons manufactured in England and Norway is now produced in ample quantity to meet all our present wants, and the product can be increased to any desirable extent, thus relieving us entirely from our former dependence on European producers for this indispensable article.

In this connexion I desire to call your attention to the entire inadequacy of the provision made for arming the militia of the States by the law of April 23, 1808, which appropriates annually $200,000 for this purpose, the disbursement of which has since that time been under the control of this department. When this law was passed the entire population of the United States was 6,853,038, and the number of men capable of bearing arms, whom it was intended to supply, was at least 1,439,137. From that day to this there has been no further legislation on this subject affecting this amount, and while to-day the number of men in the loyal States capable of bearing arms, and for whose arming especially at this time the most liberal provision should be made, is about 4,800,000, no purchase on this account can be made except from the small annual appropriations of $200,000. If the principle which led to the passage of this law in 1808 was a correct one then, it certainly is equally so now; and the experience through which the country has passed during the last two years has illustrated more forcibly than ever before the imperative necessity of a well-organized and well-armed militia, to act as a reserve force. This being the case, if $200,000 was considered by Congress as a proper sum to appropriate for this object in 1808, then, taking merely the increase of population as an argument, $1,000,000 is the proportionate amount now. But if we consider the fact that our very existence as a nation is now the question at issue, threatened as we are with dangers on all sides, I do not think an appropriation of $2,000,000 for this object any too much at this time. Already, in view of extraordinary exigencies which have arisen, there have been issued, by your direction, to certain of the loyal States arms and accoutrements of a value far in excess of the appropriation, and I earnestly recommend that the attention of Congress be called to this fact, in order that, while legislating on the subject, at least $1,000,000 may be supplied to meet this excess and cover the cost of a sufficient number of arms and accoutrements, to enable this department to distribute to the remaining loyal States the same proportionate quantity as have already been issued to those before mentioned, to whom a distribution has already been made.

I beg leave most earnestly to bring to your notice the necessity of an increase in the number and rank of the officers of the Ordnance department, and to recommend it to your favorable consideration. Organized upon a different basis from the corps constituting the line of the army, and with varied duties involving high responsibilities, an increase of rank is essential to give proper influence and position to chiefs of ordnance to armies in the field, and as an act of justice to the commandants of the more important armories and arsenals.

By the 10th section of the act of Congress of July 17, 1862, one assistant adjutant general, one quartermaster, one commissary of subsistence, and one assistant inspector general, who shall have, respectively, the rank of lieutenant colonel, constitute the staff of commanders of army corps, whilst no such additional rank is conferred on the ordnance officer representing his department at the same headquarters, and whose functions are not of less importance to the army—a distinction manifestly invidious and without just reason. The duties and responsibilities pertaining to the commanders of armories and the larger arsenals are, as you are aware, without limitation, involving the control of very large amounts of public money, and embracing in their general operations the supervision of almost every department of the mechanic arts. The present limited, and, indeed, inadequate organization of the department has devolved upon its officers an amount of labor which nothing short of untiring zeal and devotion to the interests of the service could have accomplished, and which I should be wanting in justice to them not to bring to your special notice. Their intelligent co-operation has enabled the department to meet successfully all the requirements of the war, and to keep an army of great magnitude operating over no limited space adequately supplied at all points with ordnance and ordnance stores in quantity and quality heretofore, it is believed, unsurpassed. In this connexion I would also beg leave to call your attention to the military storekeepers and paymasters of the Ordnance department. It is believed that no class of officers, in view of their responsibilities and duties, are so inadequately compensated; and I see no just reason why they should not be, within certain limits, placed upon the same footing with paymasters and quartermasters of the army.

The enormous increase in the army since the year 1860 has, necessarily, greatly augmented the business of this office, and hence it became indispensably requisite that some system should be adopted by which this vast increase could be managed and controlled. During the past year this has been successfully accomplished. The office is now separated into eleven divisions, each distinct in its duties and organization, but each forming part of the whole system of executive administration. Each division is in charge of an experienced clerk, through whom all business appertaining to the division is conducted. There are now in the hands of the army, and stored at the forts, floating property to the amount of over forty millions of dollars. The property accountability for these stores is a most important matter, and here the value of the system introduced is well illustrated. The number of property returns received during the year 1862 was 2,690. During the same period there were 20,000 officers who were accountable for ordnance stores, from whom 80,000 returns were due, but from whom only the above number were received; whereas the number of such returns which will be received at this office during 1863 is estimated at 60,000. In the other divisions of the office the absolute necessity of the system introduced is daily shown.

Congress at its last session increased the clerical force in this office to thirty-six. Since that time this number has been found totally inadequate to meet even the demands of the daily business, much less to prepare and arrange the necessary data which should be always at hand in an important department like this. After a most careful consideration of the subject, I most earnestly recommend that this force be increased so as to authorize six clerks of class 4; nine of class 3; fifteen of class 2, and one hundred of class 1; three folders and pressmen, and seven messengers. It will require this entire force for at least one year to bring up the arrears and enable this department to keep pace with the advance of the times.

I cannot conclude this report without calling your attention to the many facilities and courtesies which have been extended to this department by the very efficient Ordnance bureau of the navy, and which it affords me much gratification to acknowledge, and also to state that the two branches of the service act in harmonious concert to promote the greatest good to the public interest intrusted to them.

I have the honor to remain, very respectfully, your obedient servant,

GEO. D. RAMSAY,
Brigadier General, Chief of Ordnance.

Hon. E. M. STANTON,
Secretary of War.

Ordnance, arms, ammunition, and other ordnance stores, procured and supplied to the army since the beginning of the rebellion, and the quantity remaining on hand in the arsenals June 30, 1863.

No. 1.—CANNON AND MORTARS.

	Field guns.	Siege guns.	Sea-coast guns and mortars.	Total number.
On hand at the beginning of the rebellion	231	544	1,508	2,283
Purchased since	2,734	546	418	3,698
Total stock	2,965	1,090	1,926	5,981
Issued from the arsenals during the same period	2,481	841	1,247	4,569
Remaining on hand at the arsenals June 30, 1863	484	249	679	1,412

GEO. D. RAMSAY, *Brig. General, Chief of Ordnance.*

ORDNANCE OFFICE, *October* 27, 1863.

No. 2.—CANNON BALLS, SHELLS, AND OTHER PROJECTILES.

	Field.	Siege.	Sea-coast.	Total number.
On hand at the beginning of the rebellion	90,199	131,036	142,356	363,591
Purchased up to June 30, 1863	1,912,894	242,155	407,695	2,562,744
Total stock	2,003,093	373,191	550,051	2,926,335
Issued from the arsenals during same period	1,528,578	138,298	78,710	1,745,586
Remaining on hand at the arsenals June 30, 1863	474,515	234,893	471,341	1,180,749

GEO. D. RAMSAY, *Brig. General, Chief of Ordnance.*

ORDNANCE OFFICE, *October* 27, 1863.

Stores procured, issued, and remaining on hand—Continued.

No. 3.—ARTILLERY CARRIAGES.

	Field.	Siege.	Sea-coast.	Mortar beds.	Caiss'ns.	Travelling forges.	Battery wagons.	Total number.
l at the beginning of the ion	266	104	1, 787	106	213	117	60	2, 653
ed since, up to June 30,	1, 948	154	45	97	2, 063	348	226	4, 881
ied at the arsenals	637	484	509	234	223	58	64	2, 209
al stock	2, 851	742	2, 341	437	2, 499	523	350	9, 743
rom the arsenals during me period	2, 492	698	1, 719	207	2, 139	431	285	7, 971
ing on hand June 30,	359	44	622	230	360	92	65	1, 772

GEO. D. RAMSAY, *Brig. General, Chief of Ordnance.*

ANCE OFFICE, *October* 27, 1863.

No. 4.—SMALL ARMS.

	Muskets and rifles.	Carbines.	Pistols.	Sabres and swords.	Total number.
l at the beginning of the rebellion	437, 433	4, 076	27, 192	16, 933	485, 634
ed since, up to June 30, 1863	1, 622, 552	107, 367	230, 761	337, 555	2, 298, 235
tured at the national armory	327, 592	....	....	....	327, 592
otal stock	2, 387, 577	111, 443	257, 953	354, 488	3, 111, 461
rom the arsenals during the same period	1, 551, 576	98, 118	229, 052	271, 817	2, 150, 563
ing on hand June 30, 1863	836, 001	13, 325	28, 901	82, 671	960, 898

GEO. D. RAMSAY, *Brig. General, Chief of Ordnance.*

ANCE OFFICE, *October* 27, 1863.

No. 5.—ACCOUTREMENTS, HORSE EQUIPMENTS, AND HARNESS.

	Accoutrements.		Horse equipments.	Sets of harness for two horses.	Saddle blankets.
	Infantry.	Cavalry.			
at the beginning of the rebellion	10, 930	4, 320	574	586	....
d since, up to June 30, 1863	1, 809, 501	181, 428	203, 041	15, 452	343, 834
ed at the arsenals	21, 799	13, 048	13, 617	3, 214	....
tal stock	1, 842, 230	198, 796	217, 232	19, 252	343, 834
om the arsenals during the same period	1, 680, 220	196, 298	211, 670	17, 485	292, 708
g on hand June 30, 1863	162, 010	2, 498	5, 562	1, 767	51, 126

GEO. D. RAMSAY, *Brig. General, Chief of Ordnance.*

NCE OFFICE, *October* 27, 1863.

Stores procured, issued, and remaining on hand—Continued.

No. 6.—POWDER AND LEAD.

	Pounds of gunpowder.	Pounds of saltpetre.	Pounds of lead.	Pounds of lead bullets.
On hand at the beginning of the rebellion	1, 110, 584	2, 923, 348	636, 966	664, 800
Purchased since, up to June 30, 1863	13, 424, 363	5, 231, 731	• 58, 211, 345	13, 565, 429
Total stock	14, 534, 947	8, 155, 079	58, 848, 311	14, 230, 229
Issued and expended	13, 071, 073	....	36, 964, 121	13, 090, 394
Remaining on hand June 30, 1863	1, 463, 874	8, 155, 079	21, 884, 190	1, 139, 835

GEO. D. RAMSAY, *Brig. General, Chief of Ordnance.*

ORDNANCE OFFICE, *October* 27, 1863.

No. 7.—AMMUNITION.

	Cartridges for small arms.	Rounds of artillery ammunition.	Purcussion caps.	Friction primers.
On hand at the beginning of the rebellion	8, 292, 300	28, 248	19, 808, 000	83, 425
Purchased since, up to June 30, 1863	74, 662, 083	116, 032	689, 668, 400	1, 500, 574
Fabricated at the arsenals	447, 542, 733	2, 622, 714	79, 806, 600	6, 504, 135
Total stock	530, 497, 116	2, 766, 994	789, 283, 000	7, 088, 134
Issued and expended	378, 584, 104	2, 274, 490	715, 036, 470	5, 082, 505
Remaining on hand June 30, 1863	151, 913, 012	492, 504	74, 246, 530	1, 005, 629

GEO. D. RAMSAY, *Brig. General, Chief of Ordnance.*

ORDNANCE OFFICE, *October* 27, 1863.

REPORT OF THE JUDGE ADVOCATE GENERAL.

JUDGE ADVOCATE GENERAL'S OFFICE,
November 3, 1863.

It is well known that since the commencement of the rebellion, vast as has been the increase of the duties and labors of this office, there has been no legislative provision enlarging the instrumentalities for their performance. The machinery of the office remains as when the army consisted of but some thirteen thousand men. This condition of things is the more striking when it is remembered that in every other branch of the military service, legislation has kept pace with the wants created by the emergencies of the war.

The following is a summary of the business despatched in this office from September 1, 1862, to November 1, 1863, a period of fourteen months:

Number of records of trials by general courts-martial and military commissions reviewed	17,357
Number of reports made as to the regularity of proceedings, on applications for restoration to the service, and for the pardon of offenders, and remission or commutation of sentences	2,318
Miscellaneous reports on other questions referred to the office	172

While many of these reports are brief, many are long and elaborate, involving an examination of complicated masses of fact, and of difficult legal questions. As recorded, they occupy about two thousand quarto pages.

This augmentation of labor and responsibility has been imperfectly met by temporary details, for which it is believed there should be substituted an independent organization as a bureau, which shall continue at least during the war. That such a measure would add greatly to the efficiency of this branch of the service cannot be doubted; and for this reason it is earnestly recommended. Should this view be favorably entertained, I would suggest the following appointments as essential under such an organization:

Two assistant judge advocates general, with the rank, pay, and emoluments, each, of a major of cavalry; one fourth class, one third class, two second class, and two first class clerks.

The current business of the office requires the amount of capacity and labor which these appointments would secure.

All of which is respectfully submitted.

J. HOLT,
Judge Advocate General.

Hon. E. M. STANTON,
Secretary of War.

REPORT OF THE PROVOST MARSHAL GENERAL.

PROVOST MARSHAL GENERAL'S OFFICE,
Washington, D. C., November 17, 1863.

SIR: I have the honor to submit the following report of the operations of the Bureau of the Provost Marshal General of the United States, and of the volunteer recruiting service, and the invalid corps. The act of March 3, 1863, for enrolling and calling out the national forces, is the first ever passed by Congress in which the government has appealed directly to the citizens of the United States to create a large army without the intervention of the authorities of the respective States.

The main objects of the act may be stated in general terms as follows:

1. To enrol and hold liable to military duty the national forces.
2. To call forth the national forces by draft, and assign the "persons so drafted" to military duty in corps, regiments, or other branches of the service.
3. To secure the return of deserters, and prevent desertion.

The duties required by the act were of vast extent, and the means were not sufficiently provided in detail by the law for securing the ends proposed. The executive officers created were a Provost Marshal General, with the rank of colonel, and a provost marshal for each congressional district, with the rank of captain. For the purpose of enrolment and draft the law provided that a board should be created in each district by uniting with the provost marshal a surgeon and a civilian. This board had power to appoint persons to make the enrolment. No other means are designated by the law to carry out its purposes.

Regulations have been prepared which prescribed the details incident to the systematic execution of the law. It was important that the officers of the general government should, in executing the law, secure the co-operation of the State officers, and should act in harmony with them. To secure this end, officers of the army, carefully selected and under suitable special instructions, were detailed to act as provost marshals general of States, and directed to take posts at State capitals. This arrangement was necessary, also, to relieve this office from the burden of direct correspondence with all the district provost marshals, and to provide an official in each State to whom reference could conveniently be had for such information as might be beyond the power of the district provost marshals to afford.

THE ENROLMENT.

The object of the enrolment was two-fold: first to ascertain how many men liable to military service there were on the 1st of July last in the United States; and, secondly, to provide the means to establish between the government and each district an account of military service, in which a charge should be made of all that was due, and credit given for all that was or should be paid. No such system has heretofore been adopted; under it every citizen may be called upon to do his proper share of military duty, with a certain knowledge that it will be duly credited to him. It would seem that no arrangement could be more satisfactory to all who are willing to do their share in defence of their country.

The enrolment was commenced about the 25th of May. It proceeded rapidly in all the States except Missouri, Kentucky, West Virginia, Oregon and California, and drafts were ordered as fast as districts were enrolled and quotas could be computed and assigned. In the States referred to above, the enrolment was not commenced until after the others, on account of difficulty in selecting the necessary officers.

It was conducted with industry and care. It is believed that the errors which must necessarily occur in such an undertaking are comparatively few. Its imperfections arise from the fact that questions of alienage, physical disability, &c., could not be decided by enrolling officers, but were left to the decision of the boards. The conduct of persons desiring to evade the draft tended to aggravate the difficulty. My report to you dated August 10, to which reference is had, gives details of the measures taken to make the enrolment correct.

The opposition encountered in making *the enrolment* cannot be said to have been serious. Some of the enrolling officers were maltreated, and one or two assassinated; but prompt action on the part of the civil authorities, aided, when necessary, by military patrols, effected the arrest of guilty parties and checked these outrages.

In certain mining districts in Pennsylvania, organized bodies of miners for a time opposed the enrolment, but the measures thereupon adopted by the United States authorities overcame their opposition.

Persons arrested for violation of the 25th section of the enrolment act, or on account of obstructing the enrolment, have been turned over to the proper civil authorities for trial.

Great labor and difficulty have been experienced in the attempt to equalize between the districts of the several States the number of troops already furnished and those to be furnished. The quotas under which troops had been raised in 1861 and 1862 were based upon population, and without reference to equalizing the numbers called for among districts or towns. Much was left to individual enterprise, and certain localities, by offering bounties and adopting other means of stimulating enlistments, drew many of their own quota from the people of other places. Every new call was independent of any which had preceded it.

It was practicable to ascertain what number of men *each State* had furnished to the service of the United States at any given date; but while volunteering was going on simultaneously in various towns and districts of a State, it was found difficult, if not impossible, to equalize the draft, at any one time, among the respective districts or towns of that State; hence, complaints sometimes arose of inequality among towns and districts, for which the statute furnished no remedy, nor was it in the power of the government to remove the difficulty. The claims and statements to the bureau concerning the number of men furnished by towns were found to be conflicting, and sometimes irreconcilable.

But the knowledge obtained by the enrolment, and the establishment of the new system of keeping accounts directly with towns, counties, &c., will facilitate the assignment of future quotas, and prevent further difficulty or confusion.

Circumstances have prevented the completion of the enrolment in some of the States. As far as completed, the enrolment shows the national forces, not now in the military service, to consist of 3,113,305 men, including, of course, many whose claims to exemption will be established in case of draft.

THE DRAFT.

It was necessary that the draft should begin as soon as possible, and it was found best to adopt as the quota of each district, one fifth of the number of men enrolled in class 1, in that district. By this method of assigning quotas it became practicable to draft in each district (for its proper proportion) as soon as such district was enrolled. Other advantages beside the great saving of time resulted from this method.

The calls of 1861 and 1862 had been based upon population, and a sufficient percentage called for to make a given number. Therefore, those States which contained more females than males were really charged with a greater quota than those in which there was an excess of males.

A table annexed shows the relative number of males and females in several States, and it will be seen that some of the western States, with quotas nearly the same as some of the eastern, not only furnished their quotas and a large excess besides, but had a larger proportion of males left than eastern States which had not entirely filled their quotas, and were therefore deficient. The deficiency was thus, probably, not from unwillingness to answer the call, but from want of men, while the excess was attributable, in some degree, to the surplus of men as well as to patriotism. Thus the States to which most credits were to be given, really had a larger proportion of men left than those to which deficiency should be charged.

The main object was to apportion the number among the States so that those previously furnished and those to be furnished would make a given part of their available men, and not a given part of their population, and this object was successfully accomplished.

A consolidation and recapitulation of final reports of the draft, so far as received up to November 1st, is appended. The examination of drafted men is still in progress. Up to the 1st of November the draft had brought into service about fifty thousand men, including those who enlisted and were credited on the quotas after the draft had been ordered.

The enrolment of the forces of the United States necessarily included aliens and persons disqualified, for various reasons, for military duty, because the enrolling officer was not authorized to omit any one between the ages of twenty and forty-five. The draft was made from the lists thus composed; hence, many persons drafted were excused, thus rendering the proportion of those who were held, small as compared with those exempted. This result would have been avoided, and larger *proportion* of troops would have been secured, if the law had required the correcting of the enrolment previous to the draft; but this would have delayed the draft.

Statistics relating to the draft in the districts where it had been *completed* on the 1st of November, and a comparison of them with those on similar subjects in other countries, have been prepared under my direction, and appear in a report to me from Lieutenant Colonel Coolidge, medical inspector, accompanied by tables and appended to this report. These tables and other information have led to some modification of the list of diseases, &c., which disqualify men for military service, and the modified list has been put in force.

From these tables it will be seen that the ratio of rejections for mental and physical infirmities in the United States, France, and Great Britain, for the periods stated, were as follows:

	United States.	France.		Great Britain.		
	In 1863.	From 1831 to 1843.	In 1859.	From 1842 to 1852.	In 1860.	In 1861.
Ratio rejected per 1,000	319.1	324.4	317	335	318	451

On this subject, I also append the report of the board of medical officers, upon which the present regulations regarding the physical examination of drafted men were based, and also a report from the New York Academy of Medicine, and letters from gentlemen of high standing in the medical department.

RESISTANCE TO THE DRAFT.

The draft was forcibly resisted in New York, Boston, and Troy. The riots in the two last cities were but feeble responses to the great effort made in the first to defeat the execution of the enrolment act. The resistance in Boston was promptly suppressed by the local authorities. The steps taken by this bureau to conduct its business fairly and justly, and to secure the aid of the State officers in making the enrolment and draft, formed the subject of a special report to you, dated August 10, to which reference is had. On Saturday, the 11th of July, the draft commenced in the city of New York; on Monday, the 13th, it was broken up by a mob composed mainly of foreigners; the headquarters of two of the provost marshals were burned and the public property (excepting the records) was destroyed. The results of this riot, and condition of affairs in the State of New York, made it impracticable to resume the draft in that city until the 19th of August, when troops were sent there from the armies in the field. It was then effected without further difficulty.

CIVIL TRIBUNALS.

Many writs of habeas corpus have been served upon the officers of this bureau. The practice in regard to those issued by United States courts has been to obey the writs and abide the judgment of the court. In the cases of like writs issued by State courts, the practice has been in accordance with the opinion of the Hon. William Whiting, Solicitor of the War Department, announced in circular No. 36 from this office, requiring the officer on whom the writ was served to make return denying the jurisdiction of the State courts, and declining to produce the person held. The courts in many cases still claiming jurisdiction, regarded the officer making the return as guilty of contempt. This condition of things imposed upon the officers of this bureau difficult and embarrassing labors, and interfered materially with the successful performance of their legitimate duties.

A further obstacle was met in civil courts assuming jurisdiction in cases of claims for exemption from military duty. Section 14 of the enrolment act says: * * "*All persons drafted and claiming exemption from military duty on account of disability or any other cause* SHALL *present their claims* to be exempted TO THE BOARD, whose *decision shall be final.*" The statute thus made the board of enrolment the special and only tribunal before which claims for exemption could be tried, wisely prescribing that the decision of the board should be FINAL. But notwithstanding this, certain judges assumed jurisdiction in cases of claims for exemption, both before and after the boards had given FINAL decision on them, as required by the statute. According to the opinions of these judges, there was practically no finality in the examination of drafted men, unless they were all exempted by the boards. In one instance, during the daily examinations of drafted men, a judge ordered the records of the board of enrolment to be delivered to him in court. The order was not obeyed, inasmuch as obedience to it would have been a violation of the law, and might have delayed for an indefinite period the business of the board in that district.

The action of the civil courts in the foregoing particulars threatened for a time in several districts to defeat, or at least to suspend, the business of raising troops and of arresting deserters, and either to throw the officers of this bureau into custody, or keep them so constantly before the courts as to prevent their attendance upon the duties for which they were appointed, and thus to defeat the raising of an army according to the law. These difficulties were substantially terminated by the proclamation of the President, dated September 17, suspending the privilege of the writ of habeas corpus in certain classes of cases.

Another method appeared in Pennsylvania to obstruct the draft, by means of a bill in chancery; and an injunction was granted by a majority of the supreme court of that State, which, however, has been ordered to be disobeyed.

EXEMPTIONS.

The actual effect of the different causes of exemption in the present draft, as far as it has been *completed*, is shown in exhibit herewith.

Measures intended to remedy such defects in the law as experience has developed are in process of preparation and will be submitted when required.

I recommend that the $300 clause, as it is known, be abolished or limited to the cases of those whose religious creed, like that of Quakers, will not permit them to bear arms, but who certainly cannot be conscientiously opposed to contributing in this mode to the support of the government which protects them, though it may be driven to take up arms in doing so.

COMMUTATION MONEY.

Collectors of internal revenue were appointed in the different districts to receive commutation money.

Ten million five hundred and eighteen thousand dollars ($10,518,000) have been received from 35,060 drafted men exempted by paying $300 each. The statements annexed show the condition of this fund. The reports of the boards of enrolment, who have no control over the money, show the number of drafted men who, up to November 1, had presented receipts from collectors of internal revenue for $300 each, and to whom, upon this evidence, they had granted exemption. The receipts in each case—making the collector of internal revenue responsible for the amounts paid in—have been forwarded to this bureau by the boards of enrolment, and certificates of deposit procured by the collectors from the United States depositaries with whom they have deposited the funds weekly, (which certificates of deposit have been received in this bureau,) show that the collectors have promptly deposited the funds received.

The commutation money from the draft constitutes a substitute fund, and is now being used to procure recruits for old organizations and as bounties, to promote the re-enlistment of veteran volunteers still in service. Weekly returns of this fund are made to the Treasury Department, showing the collectors through whom it is received, the United States depositories in which it is placed, and the amounts disbursed and remaining on hand.

VOLUNTEER RECRUITING SERVICE.

The results of the volunteer recruiting service between January 1 and November 1, 1863, are shown by a tabular statement herewith.

It is probable that large re-enforcements will be obtained under the President's call of October 17, 1863, for three hundred thousand volunteers. If Congress should at an early day amend the enrolment act as proposed, the prospect of getting volunteers will be greatly improved, and the certainty of getting men by draft, if volunteering should fail, will be established.

It is recommended that $300 bounty be paid to raw recruits for old organizations, and $400 to veterans. The present pay and bounty of the soldier do not compete with the wages paid throughout the country. Procuring volunteers will be better effected by increasing the bounty than by increasing the pay.

83,242 volunteers were received into the United States service between January 1 and November 1, 1863; 68,243 of these being enlisted for three years or the war.

DESERTERS AND ABSENTEES.

Nearly twenty two thousand deserters and absentees have been apprehended by the officers of this bureau between the 1st of May and the 1st of November.

The number of deserters in October is not yet known; it is probably less than in September. Assuming, however, that it is the same, it is found that the number who deserted and absented themselves in September and October is but *one-half* as great as the number in May and June. This diminution is attributable to the increased probabilities of arrest, and to the punishments recently inflicted upon deserters. Continued success in the arrest of deserters, and adequate punishments, will, I think, reduce the evil of desertion to small proportions.

THE INVALID CORPS.

The first steps taken towards organizing the bureau of the Provost Marshal General showed the necessity for a military force for special service in the bureau. The law prevented calling out and organizing as a reserve corps, or home guards, the men in part or whole of the second class. The organization, therefore, of men who had been in service and had become unfit for further field duty was resorted to, and was commenced, by your approval of my report on this subject, dated April 17. General Order 105, dated April 28, announces the principles upon which the organization has been conducted. The objects to be accomplished by creating the corps were—

1st. To secure the military services, for garrison, hospital, and provost duty, of that class of deserving officers and men who, from wounds received in action or disease contracted in service, were unfit for further duty in the field, and who would otherwise be discharged from the service, but yet were able to do light duty, and to bring back for like purposes those who had been previously discharged on similar grounds, and were still unfit for active duty and not liable to draft.

2d. To provide honorable and useful occupation and suitable compensation for a class of persons whose claims upon the nation no one can question.

Men who have become disabled in the military service of the country are thus supported by the government; they take the places, in the interior, of troops fit for the field, and so strengthen the active armies; and though more or less disabled, they earn, and have the satisfaction of *feeling that they earn*, the compensation bestowed upon them, and by their position in this corps of honor the pride and soldierly spirit which produced their battle scars is fostered and protected by giving them useful and honorable employment, instead of leaving them inactive and in want, a burden to themselves and to the community.

The corps on 1st November consisted of 491 commissioned officers and 17,764 enlisted men. This force is organized as infantry, composing 203 companies. 160 of these companies have been formed into sixteen regiments. The remainder are not yet formed into regiments, but soon will be.

Each regiment contains six companies of the 1st battalion, and four companies of the 2d battalion. The first battalions are armed with muskets and perform garrison duty; the second battalions are armed with swords and pistols and are on hospital duty, as guards, cooks, clerks, nurses, attendants, &c. It is designed, in having the regiments composed of companies of both 1st and 2d battalions, to enable each regiment to afford proper material at any point where it may be stationed, for both garrison and hospital duty.

The corps is now in the full performance of the duties for which it was organized—duties which would otherwise have to be performed by able-bodied soldiers, and thus, though the individuals of which it is composed are unfit for field service, the army is as much strengthened as it would have been by an acquisition of the same number of men fit for active duty.

The officers have been selected on the recommendation of the military superiors under whom they served in the field, and are assigned to duty without regard to the States from which they were appointed. Men are assigned to companies in a similar manner.

DISBURSEMENTS.

Disbursing officers on duty in the bureau in this city pay by checks all the accounts of the bureau of the Provost Marshal General.

Up to November 1 the total amount paid was	$1, 190, 392 41
Accounts unpaid having been returned for correction........	348, 623 53
Total expenses of the bureau to November 1.........	1, 539, 015 94

This does not include the pay of the provost marshal, commissioner, and surgeon of each district, as they are paid by the pay department. Including this, increases the expenditures by $402,944 22.

I am, sir, very respectfully, your obedient servant,

JAMES B. FRY,
Provost Marshal General.

Hon. E. M. STANTON,
Secretary of War.

Appendix to the Provost Marshal General's report, November 7, 1863.

No. 1.

[Extract.]

WAR DEPARTMENT, PROVOST MARSHAL GENERAL'S OFFICE,
Washington, D. C., August 10, 1863.

SIR: * * * * * * *

In relation to the enrolment I would remark: the enrolling officers were sworn to execute faithfully and without partiality, favor, or affection, the duties of their offices, and all possible precaution was taken against the employment of incompetent or dishonest persons.

The enrolment commenced in New York in the latter part of May; it was carried through to completion without any serious resistance, and nothing was brought to my knowledge indicating inefficiency or unfairness in it.

It was to be expected, in the nature of things, in the city of New York, that the names of many persons would be entered more than once on the enrolment lists. The method of conducting the enrolment, and the measures taken to correct errors, can be best understood by taking as example the following report of Captain Erhardt, provost marshal of the fourth district, the one about which most complaint has been made. Captain Erhardt says:

"I have the honour to state that there have been enrolled in my district—

Of first class	54,372
Of second class	23,405
Making a total of names enrolled	77,777

"From these were taken those who actually lived in this district, and those alone were borne upon the consolidated lists sent to the Provost Marshal General, viz:

Of the first class	30,844
Of the second class	11,148
A total of	41,992

with this exception, that those who were not known to live in any other district by their own refusal to give their residence, doing business in this, were presumed to live in this, and were sent on the consolidated lists accordingly. These names were in the proportion of, perhaps, one to fifty (1 to 50,) so that perhaps eight hundred may be on the consolidated lists so subject to draft here who may show, in case of their being drafted, that they reside in another district, and are not liable. This list, with the deductions of those who reside here, would leave 35,785 enrolled here not borne upon the consolidated lists of this district.

"The enrolment of this district was made by an enrolling officer for each election district, who reported at the headquarters of the district each day with the filled sheets, which were then given in, and an account kept of the amount of sheets (filled) each enrolling officer brought in. The enrolment was completed on the 29th day of June, and the number of names returned to this office amounted to 54,372 of class 1, and 23,405 of class 2; total number, 77,777.

"The consolidation was made by first making an alphabetical list of each ward; the names were carefully revised, and the residence of every person within the ages named in the act, residing in this district, marked by the ward of this district in which he resided. They were then transferred to another copy, care being taken to gather all who resided in the ward, copying from other wards. On the completion of that copy the lists were again revised for the purpose of ascertaining duplicates in this manner: by taking the first name of each letter and going through all the rest of the letter, to ascertain that that name was down but once; then taking the second name, and again going through those remaining, until the whole had undergone a careful and actual scrutiny; and in the same manner with class 2. This was the work of many days and nights, yet it resulted in a correct list. When a doubt arose as to whether the party under search was a duplicate, an enrolling officer was sent to the residence of such a party to ascertain whether such name was a duplicate or not.

"Upon the completion of that copy another copy was made, and all errors stricken from and transfers made, should any be found in it. After a careful revision of that copy the final copy was made for the department, and from that the cards prepared for the draft, and carefully compared with the list, and verified by actual count."

The foregoing shows the efforts made to secure a complete and fair enrolment. In these efforts and in the performance of all their duties I claim for Captain Erhardt, and the board over which he presides, honesty, efficiency, and industry.

This district is taken as a sample, because it is the one the enrolment of which has been the most objected to.

The adjutant general of New York, in his report for 1862, states that the enrolment by the State (General Anthon's) in New York and Kings counties was eminently successful, and he considers the number returned substantially correct. Taking the fourth district, we find the State enrolment gave a total of 38,324; the present enrolment gives a total of 41,625, an excess of 3,301 on the State enrolment—not a great difference. The following facts connected with the two enrolments should be noted, viz: the State enrolment did not include clergymen, colored men, and others included in the United States enrolment, but it did include persons between eighteen and twenty.

The United States enrolment does not take persons between eighteen and twenty, but includes colored men, and to prevent delay on the part of the enrolling officers, and to avoid intrusting to them the decisions of important questions of exemptions, they were not permitted to decide questions of physical disability, &c., and hence they entered many who were omitted in the State lists.

* * * * * * * *

I am, sir, very respectfully, your obedient servant,

JAMES B. FRY,
Provost Marshal General.

Hon. E. M. STANTON, *Secretary of War.*

No. 2.

PROVOST MARSHAL GENERAL'S OFFICE,
Washington, D. C., October 19, 1863.

SIR: I have the honor to report for your information certain general facts connected with the draft, as shown by reports made up to this time.

The machinery for executing the enrolment act is in complete working order. The law as it stands cannot be made to develop the entire military strength of the nation, and the execution of it has been rendered exceedingly difficult by the efforts made in various ways to resist or evade it, or to escape from its operation.

Its fruits, therefore, are not as abundant as they will be from a perfected law and more thoroughly established system of executing it. All the advantages, however, which could reasonably have been expected from the law are accruing.

Its general principles distribute the burdens of military service fairly among those liable to bear them, but there is, perhaps, more generosity than justness in some of its humane provisions. With certain modifications, which can readily be made by Congress, the military strength of the country may, by the direct and indirect operation of this act, be surely and cheaply brought into the field.

Several of the western States have not been subjected to the present draft on account of the excess of volunteers heretofore furnished, and from the same cause the quotas in other western States are rendered quite small; the present draft is, therefore, but a partial one, and no specific total was established as the quota for it.

Of those drawn in the present draft, including the 50 per cent. additional, over 80 per cent. have reported in accordance with the orders of the boards.

Of the 20 per cent. who have not reported, many are not wilful deserters, being unavoidably absent, at sea and the like. The deserters are being arrested.

Of all examined, about 30 per cent. have been exempted on account of physical disability, about 30 per cent. have been exempted under the provisions of the second section of the act, or found not liable to military duty on account of alienage, unsuitableness of age, non-residents, &c. Those who are not liable to military duty, and form no part of the national forces, and therefore have been erroneously enrolled, appear in the general reports of the boards among those exempted, because their non-ability to serve could not be established until they came before the boards. The number of exemptions is thus made to appear much larger than it really is.

About 40 per cent. of the men examined have been held to service, and have either entered the army in person, furnished substitutes, or paid commutation.

About one-half of those held to service have paid commutation; of the remainder, about one-third have gone in person, and two-thirds have furnished substitutes, and all except a few in transit, and a small proportion of deserters from among the earlier substitutes accepted, are in the ranks of their regiments in front of the enemy. It is fair to suppose that most of those who wilfully fail to report, and thus become deserters, are physically fit for service; if they had been examined, the proportion exempted for physical disability would have been reduced to about twenty-five per cent. The proportion of exemptions would be still further reduced by purging the enrolment lists before the draft of all cases of manifest unfitness, and of aliens and others not liable to military duty, as may be done where this system of raising troops is well established.

The propositions above given are based upon the reports up to this time from the seventy-three congressional districts where the draft has been completed, or has most nearly approached completion.

Since the present rebellion began about 200,000 soldiers, after entering service, have been discharged on surgeons' certificate of disability. It is probable that at least one-half of them were unfit for service when received. It may be safely said that forty millions of money were uselessly expended in bringing them into the field, to say nothing of their subsequent expense to the government.

In Great Britain, under the system of voluntary enlistments, the rejections average over 27 per cent. In France, from 1831 to 1842, the average number of exemptions annually was 94,860; so that, to secure the contingent of 80,000 men, 174,860 conscripts were anually examined.

Of the recruits who presented themselves for enlistment in our regular army in 1862, 70 per cent. were rejected for physical infirmities, exclusive of age or stature. Between 1st January and 1st July last more than one-half were rejected. These were men who desired to be accepted. These proportions are of interest in connexion with the fact that less than one-third of the drafted men who desire not to be accepted have been exempted on account of physical unfitness.

There have been but few cases of incompetency, fraud, neglect, or abuse in the examination of drafted men. These men have, however, in many ways been swindled by rogues having no connexion with the boards of enrolment, as, for example, the fact that certain drafted men were physically unfit for service has become known to these sharpers, when it was perhaps not known to the men themselves, and they have so far imposed upon the ignorance or credulity of the drafted men as to get from them sums of money to secure an exemption, to which the rogues knew they were entitled and would surely receive, and the drafted men finding themselves exempted as promised, have sometimes thought and given out that they secured exemption by bribery of drafting officers, whereas they were legally entitled to exemption, and have themselves been swindled by sharpers.

All has been done that seemed proper under existing laws to check these evils, and to meet properly the few cases of criminality and incompetency which have occurred among the officers of this bureau.

All the expenditures up to this time on account of this bureau, including the enrolment, draft, and pay of officers and persons connected with it, are but little over $1,200,000. These expenditures include all made on account of the machinery which has produced the arrest and return of twenty thousand deserters.

The amount of money received from the draft up to this date is about ten times as great as all the expenses incurred on account of the enrolment act; those resulting from the New York riots are not, however, included in this statement, as they are more properly attributable to other causes and other persons than to the draft, or the officers of this bureau.

I am, very respectfully, your obedient servant,

JAMES B. FRY,
Provost Marshal General.

Hon. E. M. STANTON, *Secretary of War.*

WAR DEPARTMENT, PROVOST MARSHAL GENERAL'S OFFICE,
Washington, D. C., November 5, 1863.

COLONEL: In obedience to your instructions, I have examined and tabulated *all* the final returns received at this office from surgeons of boards of enrolment up to the 31st of October, 1863.

These returns show the number drafted in each district, and the number rejected as physically or mentally unfit for military service, with the specific causes of rejection. For the numbers "*examined*," I have had recourse to the provost marshals' returns, as only two of the reports from surgeons gave that information. These returns are, in some instances, incomplete, and do not cover the whole period embraced in the reports made by surgeons, so that the numbers reported as "rejected" do not correspond in the two returns, and the ratios of rejections in table No. 1 are consequently too high. I have, therefore, prepared, as an appendix to table No. 1, a statement of the numbers examined and rejected for physical disability, compiled from the reports of the provost marshals.

The tabular statements herewith submitted are:

Table No. 1, showing the statistics of rejections for each district, arranged according to the paragraphs of the official list of disqualifying infirmities.

Table No 2 gives the relative ratios of rejections per thousand examined in the United States, France, and Great Britain.

Table No. 3 gives the statistics of rejections for classes of diseases arranged in groups corresponding to the paragraphs in the official list of disqualifying infirmities.

Table No. 4 shows the statistics of rejections for certain specific diseases in each district.

Table No. 5 exhibits the ratios of rejections for certain specific diseases and infirmities in the United States, Great Britain, and France.

Table No. 6 gives the statistics of examinations and rejections in Great Britain for ten years, from April 1, 1842, to March 31, 1852.

Table No. 7 gives the statistics of examinations and rejections in France for thirteen years, from 1831 to 1843.

Although the general results exhibited by those tables compare very favorably with the English and French statistics, the data are by no means sufficient to warrant the deduction of positive conclusions respecting the physical condition of our people. It is to be remembered that these statistics show the result of the first enrolment and draft of our citizens; that the draft took place after two years of war, during which time over one million of men had been in the military service, and nearly two hundred thousand discharged for physical disability, many of whom, as the reports show, were subsequently drafted. It is also to be considered that the physical examinations were made by surgeons in civil life, resident in the several districts, so that the tendency would be to exempt all who had a probable cause for rejection under the regulations.

I believe that the statistics warrant the following deductions:

1st. That the official list of disqualifying diseases and infirmities is judicious, and based upon sound experience, and that any material *reduction* thereof would be unwise. On the contrary, the statistical evidence is, that in some particulars the list is too exclusive and rigid. See, for example, the comparative rejections for varicose veins and varicocele in table No. 5.

2d. That, as a general rule, the surgeons have performed their duty according to the regulations.* The exceptions, judging from statistical results, are found in the too liberal construction of paragraphs four (acute and organic diseases of internal organs) and thirty-seven, (wounds, fractures, and diseases of bones,) which are general in their character; and also of paragraphs five and twenty-two, (confirmed consumption, loss of teeth,) which are specific.

I would, therefore, recommend that the qualifying sentences of paragraphs four and thirty seven be amended, so as to require that the diseases and injuries therein enumerated should be sufficient in degree, and so well marked as to leave no doubt of the man's unfitness for the military service.

Paragraph five (confirmed consumption) should express the fact that a tendency to consumption, or incipient consumption, does not exempt; and paragraph twenty-two should be so worded as to diminish the number of rejections for loss of teeth.

These proposed alterations, with some minor modifications and changes in the number and order of the paragraphs of the official list, so as to facilitate the classification and enhance the value of the statistical returns, are herewith submitted for your consideration.

Very respectfully, your obedient servant,

R. H. COOLIDGE,
Medical Inspector, United States Army.

Col. JAMES B. FRY, U. S. A.,
Provost Marshal General, Washington, D. C.

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* Since writing the above, one report has been received in which there are a number of rejections for infirmities which are not included in the official list of disqualifications.

TABLE NO. 1.

Table showing the number of drafted men rejected as "physically or mentally unfit for the service," arranged according to the accompanying official list of disqualifying diseases or infirmities.

State.	District.	No. drafted.	No. examined.	Paragraph 1.	Paragraph 2.	Paragraph 3.	Paragraph 4.	Paragraph 5.	Paragraph 6.	Paragraph 7.	Paragraph 8.	Paragraph 9.	Paragraphs 10 and 11.	Paragraph 12.	Paragraph 13.	Paragraph 14.	Paragraph 15.	Paragraph 16.	Paragraph 17.	Paragraph 18.	Paragraphs 19 and 20.	Paragraph 21.	Paragraph 22.	Paragraph 23.	Paragraph 24.
Maine	4th	2,933	2,311	18	19	3	158	50	7	58	29	....	16	....	14	27	1	16	3	....	....	6	6	....	1
Do	5th	3,285	2,943	5	18	4	187	20	3	175	18	1	18	....	2	15	....	18	....	1	....	1	22	....	....
Vermont	2d	2,645	2,554	31	18	4	80	46	10	183	8	....	4	....	35	19	....	24	....	....	....	3	87	....	....
Massachusetts	8th	2,905	2,653	25	20	....	64	37	4	168	6	....	13	1	10	22	....	9	....	1	....	6	129	....	....
Rhode Island	1st	2,971	2,728	30	24	6	164	....	13	101	19	6	9	....	27	35	....	11	....	1	....	5	76	....	....
New York	17th	2,730	2,196	7	17	5	43	40	4	90	9	....	4	....	....	53	1	19	1	....	....	6	14	....	1
Do	20th	3,649	*	14	42	3	175	96	3	34	7	2	4	1	21	41	....	26	....	....	....	10	58	1	3
Do	22d	3,102	2,702	12	37	15	48	40	5	91	26	1	9	....	30	17	....	16	....	....	....	3	52	1	2
Do	24th	3,383	3,110	15	24	8	187	3	7	80	32	3	3	4	43	14	5	10	....	1	....	10	107	2	....
Do	29th	2,649	2,424	16	29	2	195	52	5	105	12	4	24	9	31	31	1	21	....	2	....	7	101	....	2
Pennsylvania	5th	2,983	2,328	14	24	4	103	1	2	24	9	2	13	2	....	48	....	25	2	....	....	4	63	....	....
Do	19th	3,387	3,053	15	29	2	106	48	....	37	5	1	9	2	17	15	1	17	....	....	....	3	31	....	....
Do	21st	2,873	2,622	29	21	6	59	56	6	134	16	....	23	....	12	17	....	18	....	....	....	4	53	....	....
Do	23d	2,920	2,608	6	18	5	75	44	....	60	16	....	9	1	19	24	1	17	....	....	....	4	74	2	1
Do	24th	2,995	2,665	19	18	6	107	11	2	76	10	....	23	2	17	29	3	10	2	....	....	6	34	1	1
Total		45,416	36,897	256	358	73	1,751	544	71	1,416	222	20	181	22	278	407	13	257	8	6	....	78	907	7	11

* Incomplete.

TABLE No. 1—Continued.

State.	District.	No. drafted.	No. examined.	Paragraph 25.	Paragraph 26.	Paragraph 27.	Paragraph 28.	Paragraph 29.	Paragraph 30.	Paragraphs 31 and 32.	Paragraph 33.	Paragraph 34.	Paragraph 35.	Paragraph 36.	Paragraph 37.	Paragraph 38.	Paragraph 39.	Paragraphs 40 to 44.	Paragraphs 45 to 49.	Paragraph 50.	Paragraph 51.	Miscellaneous.	No. rejected.	Ratio per 1,000 of— Drafted.	Ratio per 1,000 of— Examined.
Maine	4th	2,933	2,311	15	6	78	1	9	....	1	5	13	13	4	29	21	12	13	17	36	......	107	812	276.8	351.3
Do	5th	3,285	2,943	12	......	95	12	20	....	....	2	19	......	....	50	17	....	7	......	42	4	203	991	301.6	336.7
Vermont	2d	2,645	2,554	......	16	138	3	3	....	4	2	10	17	7	61	24	....	15	14	11	19	57	953	360.3	373.5
Massachusetts	8th	2,905	2,653	17	80	93	....	5	....	2	....	9	8	....	75	7	....	34	2	16	4	51	918	316.0	346.6
Rhode Island	1st	2,971	2,728	13	13	70	3	8	1	2	2	12	11	11	65	10	7	19	22	19	5	77	897	301.9	328.8
New York	17th	2,730	2,196	......	10	49	2	3	1	....	3	7	7	....	99	28	2	21	26	20	2	45	639	234.0	280.9
Do	20th	3,649	*	4	23	171	3	......	1	6	6	1	8	4	45	39	2	29	22	12	5	13	935	256.5	......
Do	22d	3,102	2,702	11	30	72	1	11	1	3	2	21	9	6	75	27	....	37	22	9	15	......	735	243.3	279.4
Do	24th	3,383	3,110	17	52	122	7	10	2	3	15	5	......	8	166	29	....	36	47	23	44	26	1,170	346.5	376.2
Do	29th	2,649	2,424	10	......	88	....	7	....	3	3	11	5	....	171	72	....	30	81	14	16	37	1,197	451.8	493.8
Pennsylvania	5th	2,983	2,328	2	......	91	1	5	....	2	....	20	21	4	66	24	....	22	13	21	21	72	725	243.0	311.4
Do	19th	3,387	3,053	......	......	97	1	10	....	1	1	3	......	1	70	98	26	32	18	16	12	24	748	220.8	245.0
Do	21st	2,873	2,622	......	......	50	....	9	....	8	....	8	9	6	62	3	8	20	15	7	6	......	665	231.4	253.6
Do	23d	2,920	2,608	5	53	80	4	16	....	1	....	15	6	2	58	54	3	14	25	15	5	41	773	264.2	296.3
Do	24th	2,995	2,665	5	25	61	5	6	1	....	2	12	5	1	89	23	....	16	18	12	8	25	691	230.7	259.1
Total	....	45,416	36,897	111	308	1,355	43	122	7	36	43	166	119	54	1,181	476	60	345	342	273	164	778	12,869	285.2	323.0

* Incomplete.

The numbers "examined," given in the foregoing table, are taken from the provost marshals' reports, (some of which are incomplete,) the surgeons generally reporting only the numbers "*drafted*" and "*rejected for physical disabilities.*" The ratios "*of rejected*" are more correctly given in the subjoined table, compiled from the provost marshals' returns as far as received.

APPENDIX TO TABLE No. 1.

State.	District.	No. examined.	No. rejected.	Ratio per 1,000.
Maine	4th	2,311	812	351.3
Do	5th	2,943	991	336.7
Vermont	2d	2,554	939	367.6
Massachusetts	8th	2,653	887	334.3
Rhode Island	1st	2,728	897	328.8
New York	17th	2,196	638	290.5
Do	20th	1,517	516	340.1
Do	22d	2,702	755	279.4
Do	24th	3,110	1,152	370.4
Do	29th	2,424	1,197	493.8
Pennsylvania	5th	2,328	693	297.6
Do	19th	3,053	673	220.4
Do	21st	2,622	658	250.9
Do	23d	2,608	770	295.2
Do	24th	2,665	680	255.1
Total		38,414	12,258	319.1

TABLE No. 2.

Table showing the ratios of exemptions from military service for mental and physical infirmities in the United States, France, and Great Britain.

	United States.	France.		Great Britain.			Average ratio of rejections per 1,000 examined.
Years	1863.	1831 to 1843.	1859.	1842 to 1852.	1860.	1861.	
Numbers examined	38,414	2,097,876	200,926	171,276	16,799	7,993	
Numbers rejected	12,258	680,560	63,820	57,381	5,346	3,605	
Ratio rejected per 1,000 examined	319.1	324.4	317	335	318	451	344.0

TABLE NO. 3.

Table showing the specific causes of rejection, grouped according to the official list of disqualifying diseases and infirmities, with the numbers and the ratios rejected for each class. Number examined, 38,414.

Cause of rejection.	Total rejected.	Ratio rejected per 1,000 examined.
1. Manifest imbecility or insanity	256	6.6
2. Epilepsy	358	9.3
3. Paralysis and chorea	73	1.9
4. Acute or organic diseases	1,751	45.5
5. Confirmed consumption; cancer; aneurism	544	14.1
6. Inveterate and extensive diseases of the skin	71	1.8
7. Decided feebleness of constitution, natural or acquired	1,416	36.8
8. Scrofula; constitutional syphilis	222	5.7
9. Habitual or confirmed intemperance, or solitary vice	20	0.5
10, 11. Rheumatism; pain	181	4.7
12. Great injuries or diseases of the skull	22	0.5
13, 14. Loss of sight; loss of sight of right eye; diseases of the eyes	685	17.8
15. Loss of nose; deformity of the nose; ozæna	13	0.3
16. Complete deafness; purulent otorrhœa	257	6.6
17, 18, 19, 20, 23. Dumbness, permanent loss of voice; diseases and deformities of jaws and tongue	21	0.5
21. Stammering, excessive and confirmed	78	2.0
22. Loss of a sufficient number of teeth to prevent mastication of food	907	23.6
24. Tumors of the neck; fistula of the larynx; torticollis	11	0.3
25, 26. Deformity of the chest; deficient amplitude of chest	419	10.9
27. Hernia	1,317	35.2
27. Abdomen grossly protuberant; excessive obesity	38	1.0
28, 29. Diseases of the rectum and anus; old and ulcerated internal piles	165	4.5
30, 31, 32. Diseases of the penis; incontinence of urine; stone in the bladder	43	1.1
33, 34. Diseases and injuries of the testicle	175	4.5
34. Varicocele	34	0.8
35. Curvatures and caries of the spine	119	3.1
36. Loss of an arm, forearm, hand, thigh, leg, or foot	54	1.4
37, 38, 39. Wounds; fractures; dislocations; diseases of the bones; muscular contractions and tumors	1,717	44.6
40, 41, 42, 43, 44. Loss of thumbs and fingers; deformities of hands and fingers	345	8.9
45, 46, 47, 48, 49. Deformities of feet and toes; loss of toes	342	8.9
50. Varicose veins of inferior extremities	273	7.1
51. Chronic ulcers; extensive, deep, and adherent cicatrices of lower extremities	164	4.2
52. Miscellaneous	778	20.2

TABLE No. 4.

Table showing the numbers examined in each district and rejected for certain diseases and infirmities, with the ratios rejected for each disease per 1,000 examined.

Districts	Maine, 4th.	Maine, 5th.	Verm't, 2d.	Mass., 8th.	R. I., 1st.	N. Y., 17th.	N. Y., 20th.	N. Y., 22d.	N. Y., 24th.	N. Y., 29th.	Penn., 5th.	Penn., 19th.	Penn., 21st.	Penn., 23d.	Penn., 24th.	Totals.	Ratio rejected per 1,000 examined.
Numbers examined	2,311	2,943	2,554	2,653	2,728	2,196	1,517	2,702	3,110	2,424	2,328	3,053	2,622	2,608	2,665	38,414	
Diseases.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	No.	
Imbecility	18	5	29	15	22	7	7	6	9	11	14	13	20	6	10	192	4.99
Insanity			2	10	8		7	6	6	5		2	9		9	64	1.66
Epilepsy	19	18	18	20	24	17	42	37	24	29	24	29	21	18	18	358	9.31
Diseases of brain and spinal cord	5	4	5		6	1		3	1	4	1		4	1	3	38	.98
Diseases of heart, organic	12	32	37	30		7	107	22		73		80	19	50	20	489	12.72
Diseases of heart, functional		1	20		84				32		25		2			164	4.26
Diseases of heart, inflammatory	45	1		2		1	4			5			2	2		62	1.67
Diseases of lungs, asthma	17		4		15	6	24	6		33	3	5	4		7	124	3.22
Diseases of lungs, bronchitis	18	4				2	2						11	1	12	50	1.30
Diseases of lungs, pleuritis	10	1	1			1										13	.33
Diseases of lungs, hemorrhage	12			3	1	3				12					5	36	.92
Diseases of lungs, miscellaneous	5	85	6	1	44		27		101	10	53		1	2	41	377	9.81
Diseases of stomach and intestines	12	18		18	4	9	6	2	5	20	12	5	8	7	13	139	3.61
Diseases of liver	14	30			2	7	1	8	23	12	5	10		4	1	117	3.04
Diseases of spleen		2							4	5				3	1	15	0.39
Diseases of kidneys	8	6	7	7	5	5	3	3	18	8	4	6	7	5	4	96	2.49
Diseases of bladder		3		3	3	1	1	4	3	3			1			22	0.57
Consumption	50	18	45	37		40	94	40	3	52		47	55	43	8	532	13.84
Total loss of sight								4								4	0.10
Loss of sight of right eye	14	2		10	27		13	26		27		16	8		15	158	4.11
Near-sightedness, *very decided*	5	7	12	2	22	8	17	10	3	18	7	7	5	8	5	136	3.54
Other diseases of the eyes	22	8	42	20	13	45	32	7	54	17	41	9	16	35	26	387	10.07
Hernia	76	90	136	89	65	49	171	66	114	84	91	97	50	80	59	1,317	34.28
Obesity, excessive	2	5	2	3	5			6	8	4	1				2	38	0.98
Varicocele	1	2	4	5		1		6				1		7	7	34	0.88
Loss of thumb, partial and total	5			4		3	5	4	13	6	5	6		2	2	55	1.43
Loss of index finger, right hand	2			1	8	2				13		11			2	39	1.01
Other deformities of the hands	6	7	15	29	11	16	24	33	23	11	17	15	20	12	12	251	6.53
Loss of great toe	4			2		6	8			9		7	5	1	2	44	1.45
Other deformities of the feet	13		14		22	20	14	22	47	72	13	11	10	24	16	298	7.75

TABLE No. 5.

Table showing the ratios of rejections for certain diseases and infirmities in the United States, Great Britain, and France.

Cause of rejection.	Ratio rejected per 1,000 examined.			
	U. States	Great Britain.		France.
	1863.	1860.	1861.	1831-1843.
Imbecility	4.99	2.20	0.50	....
Epilepsy	9.31	......	......	1.9
Diseases of the brain and spinal cord	0.98	0.71	0.62	....
Diseases of the heart	18.59	12.86	25.52	....
Diseases of the lungs	15.58	1.79	1.13	....
Consumption	13.84	2.26	5.00	....
Feeble constitution	36.8	31.73	41.78	91.8
Scrofula and syphilis	5.7	21.13	28.52	....
Diseases of the skin	1.8	5.54	8.63	12.51
Diseases of the eyes, (myopia included)	17.8	28.75	28.52	15.4
Myopia	3.54	......	......	4.6
Diseases of the ears and deafness	6.6	3.10	4.51	....
Diseases of the nose and mouth	0.8	0.77	1.63	....
Stammering	2.0	1.31	1.63	....
Loss of teeth	23.6	9.52	7.76	8.5
Deformity and deficient size of chest and curvature of the spine	14.0	25.30	55.67	....
Hernia*	34.28	11.79	14.89	24.5
Hemorrhoids	3.17	5.00	5.88	....
Varicose veins	7.1	28.63	40.79	....
Varicocele	0.88	13.39	23.52	....

NOTE.—This comparison is as complete as the different classifications in the English and French returns will admit.

* The English returns exempt in 1860, 6.13, and in 1861, 11.76 per 1,000, for laxity of abdominal rings, showing tendency to hernia.

TABLE No. 6.

*Table showing the causes of rejection of the recruits found unfit for service at the headquarters of each of the recruiting districts in Great Britain, in the ten years from April 1, 1842, to March 31, 1852.**

	London.	Bristol.	Coventry.	Liverpool.	Leeds.	Edinburgh.	Glasgow.	Cork.	Dublin.	Newry.	Total English districts.	Total Scotch districts.	Total Irish districts.	General total.	Ratio rejected per 1,000 examined.
Total examined	45, 613	13, 366	10, 065	18, 622	7, 994	9, 569	18, 510	18, 086	19, 104	9, 347	96, 660	28, 079	46, 537	171,276	......
I. Weak intellect	33	5	5	17	7	7	18	20	52	13	67	25	85	177	1
II. Unsound health, marks of treatment	1, 266	322	191	408	260	456	680	145	680	225	2, 447	1, 136	1, 050	4, 633	27. 1
III. Muscular tenuity, want of physical power	1, 676	304	235	231	88	288	605	508	840	208	2, 534	893	1, 556	4, 983	29. 1
IV. Affections of the eyes	1, 243	240	148	353	159	225	272	177	340	68	2, 143	497	585	3, 225	18.8
V. Loss or decay of teeth	982	160	174	239	185	79	166	110	190	13	1, 740	245	313	2, 298	13. 4
VI. Deformity of the spine	901	106	133	298	134	145	264	155	129	148	1, 572	409	432	2, 413	14. 1
VII. Want of due capacity, or malformation of chest	1, 308	258	213	634	187	279	578	151	319	183	2, 600	857	653	4, 110	24
VIII. Defective condition of the superior extremities	566	284	106	331	173	160	311	153	295	91	1, 460	471	539	2, 470	14. 4
IX. Hernia	847	171	72	177	103	84	203	158	73	72	1, 370	287	303	1, 960	11. 4
X. Tendency to rupture from laxity of the groins	879	150	100	518	64	179	387	205	397	51	1, 711	566	653	2, 930	17. 1
XI. Varicose state of veins of the spermatic chord	1, 473	340	157	600	270	201	438	68	339	79	2, 840	639	486	3, 965	23. 2
XII. Disease or injury of the testicles	248	92	21	94	56	124	168	84	68	47	511	292	199	1, 002	5. 9
XIII. Varicose state of veins of the lower extremities	1, 162	279	214	1, 192	339	506	1, 214	480	1, 032	257	3, 186	1, 720	1, 769	6, 675	39
XIV. Defective condition of the inferior extremities	1, 532	760	339	656	375	426	915	466	742	282	3, 662	1, 341	1, 490	6, 493	37. 9
XV. Cicatrices, ulcers, wounds, and chronic diseases of the skin	757	189	155	344	285	330	668	468	621	138	1, 730	998	1, 227	3, 955	23. 2
XVI. Tendency to consumption	215	103	32	44	40	2	129	10	49	30	434	131	89	654	3. 8
XVII. Diseases of the heart	256	38	21	112	17	76	112	106	140	55	444	188	301	933	5. 5
XVIII. Impaired hearing or deafness	186	47	15	46	32	24	14	8	19	6	326	38	33	397	2. 3
XIX. Impediment of speech	105	29	13	33	8	13	31	22	27	18	188	44	67	299	1. 7
XX. Syphilis	295	81	81	106	120	127	174	62	140	29	683	301	231	1, 215	7. 1
XXI. Marks of corporal punishment	157	36	11	49	18	10	17	15	22	5	271	27	42	340	2
XXII. Marked with the letter D	87	22	17	41	15	13	22	5	30	7	182	35	42	259	1. 5
XXIII. All other causes	527	88	131	322	196	15	112	210	264	130	1, 264	127	604	1, 995	11. 6
Total rejected	16, 701	4, 104	2, 584	6, 845	3, 131	3, 769	7, 498	3, 786	6, 808	2, 155	33, 365	11, 267	12, 749	57, 381	335

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* Taken from "Report of the commissioners appointed to inquire into the regulations affecting the sanitary condition of the army, the organization of military hospitals, and the treatment of the sick and wounded," &c. Published, London: 1858.

TABLE NO. 7.

Table showing the number of young men exempted from military service on account of physical unfitness, in France, in each year from 1831 *to* 1843, *inclusive, and specifying the various causes of exemption.—(Compiled from the "Comptes rendus au Roi sur le Recrutement de l'Armée.")**

	1831.	1832.	1833.	1834.	1835.	1836.	1837.	1838.	1839.	1840.	1841.	1842.	1843.	Total.	Ratio exempted per 1,000 examined.
Total examined, exclusive of "rejected for want of height"	155,606	151,343	157,319	157,306	159,325	164,474	164,474	161,363	167,240	162,913	162,787	167,071	166,655	2,097,876	....
Loss of fingers	752	647	743	672	767	760	803	810	919	806	688	804	772	9,943	4.8
Loss of teeth	1,304	1,243	1,392	1,377	1,378	1,472	1,599	1,381	1,326	1,373	1,273	1,335	1,454	17,907	8.5
Deaf and dumb	830	736	725	581	506	540	542	562	544	558	520	488	499	7,631	3.6
Loss of members or organs other than those which are in the three preceding columns	1,605	1,530	1,580	1,630	1,505	1,842	1,674	1,486	1,662	1,606	1,723	1,739	1,699	21,281	10.2
Goitres	1,125	1,231	1,298	1,435	1,496	1,522	1,351	1,361	1,357	1,281	1,207	1,241	1,295	17,200	8.2
Lameness	949	912	1,049	963	985	927	974	772	813	769	848	794	957	11,712	5.5
Deformities other than those in the two preceding columns	8,007	7,630	8,494	8,921	9,179	10,053	9,699	9,885	9,215	9,142	9,149	9,381	10,121	118,876	56.6
Diseases of the bones	782	617	667	762	541	746	643	684	712	796	768	693	733	9,144	4.3
Myopia	948	891	920	890	783	768	679	670	684	635	644	595	562	9,669	4.6
Diseases of the eyes other than myopia	1,726	1,714	1,839	1,763	1,857	1,811	1,716	1,664	1,787	1,745	1,553	1,683	1,696	22,554	10.8
Itch	11	10	10	4	10	8	11	13	8	14	12	20	5	136	.06
Scurf	749	800	794	740	788	771	777	740	815	767	773	831	776	10,121	4.8
Leprosy	57	19	29	6	54	12	16	19	7	30	24	28	23	324	.15
Diseases of the skin other than those in the three preceding columns	937	983	895	1,031	1,073	1,424	1,304	1,231	1,215	1,174	1,493	1,687	1,255	15,702	7.5
Scrofulous vices	1,730	1,539	1,272	1,261	1,671	1,778	1,552	1,788	1,922	1,709	1,870	2,010	2,034	22,136	10.6
Diseases of the chest	561	423	359	417	496	679	737	761	515	491	438	476	794	7,147	3.4
Hernias	4,044	3,579	4,222	3,994	3,921	4,532	4,023	3,800	4,174	3,554	3,693	3,922	3,856	51,314	24.5
Epilepsy	463	367	342	307	277	272	276	296	304	284	252	281	275	3,996	1.9
Various other diseases	9,168	9,058	10,286	9,962	9,998	9,695	10,851	9,282	10,242	8,937	9,047	9,332	9,105	124,963	59.6
Febleness of constitution	11,783	9,979	11,259	11,600	11,724	14,176	15,342	14,634	19,366	18,395	18,903	20,932	20,711	198,804	94.8
Total	47,531	43,908	48,175	48,316	49,009	53,788	54,569	51,839	57,587	54,066	54,878	58,272	58,622	680,560	324.4

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* Taken from "Report of the commissioners appointed to inquire into the sanitary condition of the British army," &c., &c. Published, London: 1858.

Proceedings of a board of medical officers, convened at Washington city by the following order:

Special Orders No. 163.

WAR DEPARTMENT, ADJUTANT GENERAL'S OFFICE,
Washington, April 9, 1863.

[Extract.]

* * * * * * * * * *

A board of medical officers, to consist of Medical Inspector R. H. Coolidge, United States army; Surgeon Meredith Clymer, United States volunteers; Assistant Surgeon Roberts Bartholow, United States army, will convene in this city, on the 10th instant, to prescribe rules for governing "boards of enrolment" in determining who shall be exempt from draft as physically or mentally unfit for the service.

* * * * * * * * * *

By order of the Secretary of War:
E. D. TOWNSEND, *Assistant Adjutant General.*

Official: ROB'T WILLIAMS, *Assistant Adjutant General.*

WASHINGTON, D. C., *April* 15, 1863.

The board met pursuant to the foregoing order, and continued in session from day to day, except Sunday, until the final adjournment. During the first two days of the session of the board, Medical Inspector R. H. Coolidge and Surgeon Meredith Clymer only were present. Assistant Surgeon Roberts Bartholow reported from general hospital, Fort Schuyler, and was present for duty on Monday, April 13. During the subsequent meetings of the board all the members were present.

The board very carefully, and as thoroughly as the terms of the law permitted, proceeded to prescribe rules for governing "boards of enrolment in determining who shall be exempt from draft as physically or mentally unfit for the service." Whilst profoundly impressed with the necessity of permitting no man to secure exemption from military duty who is mentally and physically qualified, they were equally solicitous to avoid encumbering the army with useless recruits. Fortunately the performance of this duty was rendered less perplexing by the conviction that the interests of the government and the necessities of individuals are identical. The list of disqualifying infirmities herewith submitted is large, and it will be seen that a regard for the effectiveness of the army, as well as for diseased and disabled citizens, would not permit us to overlook those conditions which positively, or relatively, incapacitate men for the performance of military duty.

In the French military service, where the necessities of the state are held superior, the unwise admission of conscripts affected with various disqualifying infirmities has rendered it necessary, to avoid the great expense to the state of maintaining and discharging useless conscripts, to increase the number and variety of causes of disqualification.

In 1854 such was the number of conscripts of feeble constitution that the Emperor, on the 7th of March, 1856, addressed a letter to the minister of war on the subject, in which he states that, of the whole number passed, 5,694 were subsequently discharged for this cause, by which the treasury sustained a loss of 1,500,000 francs.

From 1831 to 1842 the mean average number of exemptions was annually 94,860, from which it results that, to secure the contingent of 80,000 men, not less than 174,860 young men were annually examined.

The "act for enrolling and calling out the national forces" does not establish the *stature* of drafted men. In this country and in Europe the minimum height is generally fixed by the minister of war; and, in our service, the stature of the recruit is not determined by the surgeon, but by the recruiting officer.

The board has therefore hesitated to incorporate in its synopsis of disqualifications any rule concerning stature. The subject is an important one. In the army of the United States the minimum standard height of 5 feet 8 inches for artillery and 5 feet 6 inches for infantry, in 1825, has been gradually reduced, until now it is fixed at 5 feet 3 inches. The minimum standard height of the Roman soldier was 5 feet 2¼ inches, and the present standard of the British and French armies is, respectively, 5 feet 5 inches and 5 feet 1½ inch.

The board think it would be unwise to lower the present standard, and injudicious to leave boards of enrolment without a definite rule of action.

Although the maximum standard height has not hitherto been made a subject of regulation, the physiological and hygienic reasons therefor are as potent as those fixing the *minimum* standard.

The board therefore respectfully recommend that the following paragraph be added to the list of disqualifications:

52. Stature: If the height of the drafted man be greater than six feet four inches, or less than five feet three inches, he is disqualified for military service. The height, in all doubtful cases, to be determined by accurate measurement, the recruit being made to stand erect on his bare feet, and care being taken that he neither increases nor lessens his stature by voluntary effort. Weight: The minimum 110 pounds; maximum 220 pounds.

Note 1. * * * * * * * *

R. H. COOLIDGE,
Medical Inspector, United States Army.
Surgeon MEREDITH CLYMER,
United States Volunteers.
Assistant Surgeon ROBERTS BARTHOLOW,
United States Army, Recorder of the Board.

Official: R. H. COOLIDGE, *Medical Inspector, United States Army.*

NOTE 1.—Here followed the list of disqualifying diseases, and directions for examining drafted men as published in regulations.

Report of a committee of the New York Academy of Medicine, appointed at the meeting held October 8, 1863, with power to consider the list of diseases and infirmities which disqualify drafted men for the military service of the United States, as contained in the "Regulations for the government of the Bureau of the Provost Marshal General."

The committee, consisting of Gurdon Buck, M. D., Professor Willard Parker, M. D., Professors A. C. Post, M. D., W. Detmold, M. D., Valentine Mott, M. D., A. H. Stevens, M. D., J. W. Draper, M. D., Austin Flint, M. D., W. H. Van Buren, M. D., and Jno. Ordroneaux, M. D., met, pursuant to call, on Monday, October 12, Dr. Gurdon Buck, chairman, and Dr. Van Buren, secretary, and proceeded to examine the list of disqualifications by paragraphs, with the following result in suggestions and recommendations for alterations, viz:

Paragraph 1st recommended to be altered to "*Insanity, or manifest imbecility.*" (This is designed to include well-established previous insanity, with liability to recurrence.)

Paragraph 2d. That last two words, "*a convulsion,*" be altered to "*the disease.*" (A case is known to the committee in which the only physician who had actually witnessed a convulsion had left the country.)

Paragraph 6th. To insert "*such as*" in place of "*which.*" (Renders meaning less obscure.)

Paragraph 14th. To insert "*granular lids*" after "*chronic ophthalmia.*"

Paragraph 16th. To substitute "*decided*" for "*complete,*" and insert "*chronic*" before "*purulent otorrhœa.*"

Paragraph 25th. To add "*or sternum.*"

Paragraph 27th. To omit all after "*hernia.*" (As it stands, it might be inferred that umbilical or ventral hernia were not disqualifying causes.)

Paragraph 34th. To omit "*and cirsocele,*" and to substitute "*is*" for "*are.*"

Paragraph 35th. Recommended to substitute "*excessive curvature*" for "*excessive anterior or posterior curvature.*" (This would include also excessive lateral curvature.)

Paragraph 43d. To substitute "*second and third*" for "*first and second.*"

Paragraph 47th. To substitute for the paragraph "*overriding or mal-position involving all the toes.*"

Paragraph 50th. To omit "*having clusters of knots, and.*"

On motion, it was unanimously

Resolved, That the committee, apart from the alterations above suggested, fully approves the list of disqualifications, regarding its provisions as humane, judicious, and based upon the soundest experience.

Also resolved, That the secretary of the committee be instructed to forward a minute of the proceedings of this meeting to the Surgeon General of the United States army, for the use of the Provost Marshal General.

GURDON BUCK, M. D., *President Committee.*

WM. H. VAN BUREN, M. D., *Secretary.*

PROVOST MARSHAL GENERAL'S OFFICE, *November* 6, 1863.

Official: HENRY STONE, *Assistant Adjutant General.*

Extract of a letter from Dr. Henry J. Bowditch.

BOSTON, *August* 25, 1863.

MY DEAR SIR: If I have seemed dilatory in answering your letter, it is because I wanted to think carefully before writing.

The more I consider the matter, and the more I place the questions before my professional brethren, the less do we find to *diminish* the number of causes of disability. If the government wants "*able-bodied*" men, it will have to *hunt* for them now, especially since the process of drafting has commenced.

* * * * * * * * * *

I have, at your request, jotted down a few suggestions on your present list of disabilities. I will now name them:

No. 6. I should make more definite as to amount of and character of the disease, parts affected, contagiousness or not; whether scaly or otherwise. Psoriasis, of course less offensive than eczema or impetigo, &c.

11. Query: If severe periodically-occurring "sick headaches" and vomiting should afflict a man, should it not be allowed?

13. I should say the loss of either eye ought to exempt.

14. Myopia will plague the examining surgeon more than anything else. Dr. Derby (my expert) writes that he thinks a vast number will escape who ought to go; and, *vice versa,* others will go who will shoot at a blue coat quite as quickly as at a butternut.

16. Total deafness of even *one* ear I think should exempt.

22. More definiteness, if possible.

26. I doubt whether many would go of whom you required "the two inches," at least during common examination. The distance from sternum to spine (*i e.,* flatness of chest) is quite as important as the circumference.

37. A little more definiteness in regard to date of injury, amount of *habitual* lameness, to be known under oath from unprejudiced citizens.

* * * * * * * *

Ever faithfully, yours, HENRY J. BOWDITCH.

A true copy. EDWARD T. WHITTINGHAM,
S. G. O., *Aug.* 29, 1863. Asst. Surgeon U. S. A.

PHILADELPHIA, *August* 29, 1863.

SIR: Absence from home has prevented me from replying to your letter of the 12th intstant at an earlier period.

I have carefully examined the paragraphs marked in red ink in the "Regulations for the government of the Bureau of the Provost Marshal General of the United States," and find but little to criticise. They seem to me to be, as a whole, as perfect as it is possible to render them.

To paragraph 11th some exception may be urged. Thus, it is stated that neuralgia, in none of its forms, should be admitted as a cause for exemption, unless accompanied by manifest disorder of the general health, wasting of a limb, or other serious local disease. It has occurred to me to see a large number of cases of neuralgia in various parts of the body without any of these concomitants, and yet the patients would, I am sure, have been utterly unfit for military duty. In such cases exemption should, of course, not be granted without the certificate of the attending physician.

Paragraph 15th grants exemption on account of the loss of a nose. It is difficult for me to perceive why such a defect, if it does not interfere with respiration, should prevent a man from fighting.

Paragraph 28th. Fistula of the anus, in ordinary cases, is so easily remedied, that it should not be regarded as a disqualifying circumstance, and yet I have known several men in this city to be exempted on this account, notwithstanding they were quite wealthy.

Paragraph 33d grants exemption on account of loss or atrophy of both testicles, and also on account of the retention of these organs within the inguinal canal. I cannot see why the first two of these affections should in anywise interfere with the duties of a soldier, if he is well formed and sound in other respects; nor ought the retention of the testicles in the groin be, in my opinion, a sufficient cause for exemption, unless accompanied by hernia. A man thus affected may be as strong as when these organs are situated in the scrotum, as I know from personal observation.

Many men, I fear, are admitted into the army who are utterly unfit for field duty in consequence of the feebleness of their organization. The offspring of phthisical and syphilitic parents should, in my judgment, as a general rule, be excluded from the service as incapble of bearing up under its hardships. The enlistment of such persons is not only useless to the government, but a source of expense and annoyance.

I have the honor to be, sir, very respectfully, your friend and obedient servant,

S. D. GROSS.

General HAMMOND,
Surgeon General U. S. Army, &c.

A true copy.

E. S. DUNSTER,
Asst. Surgeon U. S. A.

WASHINGTON, D. C., *October* 22, 1863.

COLONEL: I have the honor to acknowledge the receipt of your communication of this date, enclosing "a copy of the report of a committee of the New York academy of medicine on the list of disqualifications of drafted men," and asking whether, in my opinion, "the adoption of the recommendations made by the committee will lead to an increase or diminution in the number of drafted men held to service."

In reply, I have to state that the adoption of the recommendations of the committee will lead to a diminution in the number of drafted men held to service; or, in other words, the numbers exempted on account of physical and mental infirmities would be somewhat increased.

Having been president of the board of medical officers which was convened "to prescribe rules for governing boards of enrolment in determining who shall be exempt from draft as physically or mentally unfit for the service," I venture to offer a few remarks explanatory of the action of the board on two of the points referred to by the committee, not with a view to criticism, but solely that you may more clearly understand the true meaning of the changes proposed.

Paragraph 34 of the official list of disqualifying diseases and infirmities reads "* * * varicocele and cirsocele are not in themselves disqualifying." The committee propose to omit the word "cirsocele," so that the sentence would read "varicocele is not in itself disqualifying."

Some of the older writers use the word varicocele to designate an enlarged condition of the veins of the scrotum, and apply the term cirsocele to an enlargement of the veins of the spermatic cord; modern authors describe both conditions as varicocele. The use of the word cirsocele by the board was perhaps superfluous, but it was intended to show positively that the graver condition—that is, enlargement of the veins of the spermatic cord—did not disqualify.

The committee recommend that paragraph 43 be changed so as to read "loss of the *second and third* phalanges of the fingers of the right hand," instead of "first and second," as it now stands. The two expressions are intended to mean the same thing. The board, after some discussion, used the words "first and second phalanges of the fingers," in deference to popular usage, though, anatomically speaking, the ungual phalanx is the *third* and not the *first*.

Concerning the communications on this subject from Professor S. D. Gross, M. D., and Henry J. Bowditch, M. D., which you have submitted for my perusal, I respectfully offer the following remarks:

Professor Gross comments on "the loss of the nose," "fistula in ano," "loss or atrophy of both testicles, or their retention within the inguinal canal," as "disqualifying infirmities." In my opinion, the loss of the nose disqualifies, for three reasons: 1st. It is usually the result of a constitutional vice, scrofulous or syphilitic. 2d. On marches over dusty roads, it is, to say the least, a source of very great discomfort. 3d. Soldiers have great repugnance to associating and sleeping with one who has this defect.

Paragraph 28 of the official list reads "fistula in ano is not a positive disqualification, but may become so, if extensive or complicated with visceral disease." "Loss or complete atrophy of both testicles," (not their mere absence from the scrotum,) is so likely to be followed by loss of manly courage, that, in my opinion, a person with such infirmity should not be placed in a situation where cowardice would be punished by an ignominious death; and, indeed, I doubt whether such a person is liable to military service under the law which applies only to "able-bodied *male* citizens." When the testicles are retained in the groin they become so inflamed, enlarged, and painful, on marches or long rides, as to unfit for active service.

Doctor Bowditch suggests more definiteness in paragraph 22, and in this I fully agree, and recommend that the application of that paragraph be restricted to those cases where the loss of teeth is so great that if the man were restricted to solid food he would soon become incapacitated for military service.

Very respectfully, your obedient servant,

R. H. COOLIDGE,
Medical Inspector, U. S. A.

Colonel JAMES B. FRY, U. S. A.,
Provost Marshal General, Washington, D. C.

CONSOLIDATION OF

From all districts in which the draft was completed, up to November 1, 1863,

State.	Districts.	Exempted for physical disability.	Only son of a widow, &c.	Only son of aged parents, &c.	Elected under 4th clause.	Only brother of children not 12 years old.	Father of motherless children under 12 years.	Two brothers in service, &c.	Convicted of felony.	In service March 3, 1863.	Aliens.	Over 45 years of age.	Over 35, and married.	Under 20 years of age.	Non-residents.	Paid commutation money.	Substitutes accepted and delivered at general rendezvous.
Maine	3d	1,052	59	121	38	1	32	13	..	50	25	1	191	26	85	738	251
Do.	4th	812	79	99	91	..	53	9	1	27	115	3	73	18	33	196	270
Vermont	1st	574	51	59	45	1	24	15	2	7	111	9	119	40	50	724	148
Do.	2d	939	48	143	28	1	26	12	2	44	21	5	48	10	74	729	252
Do.	3d	630	31	45	18	..	21	13	1	23	208	5	56	34	31	394	205
Massachusetts	1st	1,029	101	95	71	1	31	4	3	40	160	....	77	16	46	65	350
Do.	2d	1,440	83	45	71	3	44	15	7	56	174	14	50	13	92	222	324
Do.	3d	1,165	141	48	......	..	57	7	2	58	838	83	286	57	106	327	278
Do.	4th	1,234	151	16	29	2	40	12	7	67	798	59	174	32	214	134	162
Do.	5th	1,301	84	61	28	2	40	12	2	62	34	9	42	6	46	333	245
Do.	6th	1,526	96	35	50	..	43	10	3	54	123	*	*98		97	244	88
Do.	7th	1,043	15	84	12	1	40	15	1	19	215	3	56	8	154	437	202
Do.	8th	887	62	95	58	1	27	30	..	42	338	7	102	36	59	628	113
Do.	10th	1,154	118	78	8	..	41	23	4	26	495	9	79	34	94	679	50
Rhode Island	1st	897	110	47	108	1	26	31	3	162	302	19	112	39	172	319	304
Do.	2d	423	34	32	15	2	6	....	1	58	54	4	33	21	54	130	287
Connecticut	1st*	747	91	61	45	3	35	20	3	26	453	27	130	50	71	428	642
Do.	2d	821	125	63	60	2	41	25	..	43	211	19	65	47	139	296	564
Do.	3d	795	67	59	37	3	21	10	1	33	251	13	86	29	58	232	342
New York	8th	432	80	13	1	1	30	7	1	71	313	47	462	75	54	74	277
Do.	16th	655	71	147	16	1	26	3	..	16	184	7	121	72	33	342	100
Do.	17th	681	46	73	25	1	20	54	..	35	265	4	115	38	25	492	145
Do.	24th	1,152	62	104	13	..	22	9	1	48	183	19	136	41	63	906	116
Do.	26th	1,087	53	50	12	1	23	14	2	42	53	2	101	44	55	956	100
Do.	27th	1,353	90	104	35	3	54	71	2	31	134	5	273	30	116	506	187
Do.	28th	970	94	151	23	..	32	32	1	63	402	4	153	44	77	440	292
Do.	29th	1,197	47	62	9	..	14	9	3	12	134	6	110	38	61	505	115
Do.	30th	1,187	85	102	59	1	20	12	2	28	393	....	297	94	101	217	410
Pennsylvania	3d	1,251	172	24	3	..	46	17	..	317	360	*	*457		48	48	382
Do.	5th	693	61	35	11	1	27	17	..	21	203	6	141	40	34	196	713
Do.	6th	845	58	48	7	..	35	12	1	25	116	18	112	33	31	467	562
Do.	7th	898	67	31	13	1	19	5	1	209	216	14	90	39	39	503	309
Do.	9th	712	63	54	41	..	35	29	1	147	86	10	85	43	69	1,214	36
Do.	15th	844	87	52	43	4	29	28	2	112	33	11	109	67	57	1,192	185
Do.	19th	753	57	111	249	..	38	24	2	39	177	2	100	39	63	922	138
Do.	20th	1,089	137	214	98	1	48	39	2	78	116	3	116	58	88	972	101
Do.	21st	658	70	51	62	..	40	37	..	40	37	*	*174		.....	817	176
Do.	23d	770	91	50	16	2	25	32	..	52	147	3	101	34	57	790	164
Do.	24th	680	98	49	3	..	39	58	1	46	74	17	102	45	35	1,031	146
D. Columbia	....	1,018	256	62	7	6	84	6	11	81	435	76	326	166	394	293	671
Total	40	37,394	3,391	2,873	1,558	47	1,354	791	76	2,410	8,987	543	5,558	1,556	3,175	20,138	10,402

*Including over 4 and under 20 years of age.

FINAL REPORTS

not including those in which the draft was still in progress at that date.

Substitutes accepted and deserted before reaching general rendezvous.	Drafted men delivered at general rendezvous.	Drafted men deserting before reaching general rendezvous.	Total examined.	Number failed to report.	Total drawn.	Expiration of time at which drafted men were ordered to report.	Substitutes at this post.	Drafted men at this post.	Cases disposable.	Enlisted previous to draft.	Improperly enrolled.	Died.	Mental disability.	Arrested, &c.	Drafted men accepted and furloughed.	Discharged.	Deserter—rebel army.	Promoted since draft.	Not served notice.	Drafted twice.	Deserted after reporting.	In jail as a witness.	In camp to be sent forward.	Gone to Germany.
13	148		2,864	676	3,540	Sept. 25	9	11																
4	242	79	2,311	622	2,933	Sept. 30			107															
6	79		2,090	166	2,256	Sept. 3				13	13	4												
8	125		2,554	91	2,645	Aug. 28				4		4	27											
11	122	41	1,889	241	2,170	Oct. 20			40															
11	15		2,130	786	2,916	Aug. 31			1						14									
14	48		2,722	131	2,853	Oct. 10						7												
17	33		3,503	1,105	4,608	Sept. 5																		
34	17		3,182	1,016	4,198	Sept. 18																		
	63		2,370	289	2,777	Sept. 1				118														
15	35		2,528	184	2,712	Sept. 30									11									
6	82		2,416	233	2,649	Sept. 22				16		5				2								
6	110	20	2,653	252	2,905	Sept. 20							25		6									
1	87	9	3,027	368	3,395	Sept. 26			46			1												
27	49		2,728	243	2,971	Oct. 1																		
61	56		1,279	71	1,350	Sept. 1						3				5								
8	50	11	2,902	343	3,245	Oct. 22										1								
6	34	71	2,734	174	2,908	Oct. 16																		
4	46		2,087	267	2,354	Sept. 11											1	1						
4	4		2,053	1,022	3,075	Oct. 1									107									
19	97	2	1,913	477	2,390	do		1																
26	74	2	2,196	468	2,730	Aug. 20		15		3	8	2							43	4	66			
15	118		3,110	359	3,383	Sept. 30				1			13									1	1	
	166	47	2,851	376	3,227	Sept. 11			39	1						3								
4	208	46	3,268	390	3,658	Oct. 3				13		3												
6	56		2,890	375	3,265	Oct. 2			3				13		34									
42	57		2,424	226	2,649	Oct. 6			1													1		
29	26		3,120	688	3,808	Oct. 20						2	19		36									
	20		3,578	944	4,522	Sept. 24			422															
45	24	2	2,397	586	2,983	Sept. 19				7			13		23	35				3	46			
5	18		2,601	400	3,001	Oct. 3				171	23	4		1		3				6				
27	55		2,536	303	2,839	Oct. 12																		
1	133	1	2,857	265	3,122	Oct. 31				89		5				3								
	181		3,163	250	3,460	Oct. 9			91	26	9	1				47								
25	234	37	3,053	334	3,387	Oct. 23				38		4												1
11	103		3,274	626	3,900	Oct. 3																		
	273		2,622	251	2,873	Sept. 30			24	79		1									35			
33	227		2,608	318	2,926	Sept. 10				5						9								
19	193		2,665	340	2,995	Aug. 31				19														
5	214		4,114	1,684	5,798	Oct. 3						2												
568	3,922	368	107,262	17,940	125,376		9	27	774	603	53	48	110	1	231	108	1	1	43	13	147	2	1	1

Table showing the population by sexes, and the preponderance of either sex in certain States, according to the census of 1860, *and the number enrolled in Class I,* 1863, *with the ratio of enrolment to male population.*

States.	Males.	Females.	Excess of males over females.	Excess of females over males.	Number enrolled in Class I, 1863.	Ratio of enrolment to male population.
Maine	317,189	311,090	6,099	....	53,626	17 per ct.
New Hampshire	159,816	166,257	....	6,641	26,674	16¾ "
Vermont	158,786	156,312	2,474	....	23,568	15 "
Massachusetts	596,713	634,353	....	37,640	107,095	18 "
Rhode Island	84,133	90,487	....	6,354	14,403	17 "
Connecticut	225,994	234,153	....	8,159	38,456	17 "
New York	1,933,532	1,947,203	....	13,671	427,148	22 "
New Jersey	336,045	336,972	....	927	66,842	20 "
Pennsylvania	1,454,319	1,451,796	2,523	....	274,007	18¾ "
Delaware	55,829	54,639	190	....	8,181	14¾ "
Maryland	296,585	313,275	....	16,690	not comp'te	....
District Columbia	35,499	39,581	....	4,082	19,327	54½ per ct.
Ohio	1,190,162	1,149,349	41,813	....	207,806	17½ "
Indiana	699,260	651,168	48,092	....	134,500	19½ "
Illinois	900,761	809,190	91,571	....	183,501	20⅛ "
Kentucky	479,312	450,889	28,423	....	not comp'te	....
Missouri	564,841	502,240	62,601	....	....do....	....
Michigan	393,486	353,112	40,374	....	79,985	20⅛ per ct.
Wisconsin	407,459	368,432	39,027	....	74,566	18¼ "
Iowa	354,593	320,420	34,173	....	63,082	17¾ "
Minnesota	91,930	77,824	14,106	....	20,805	22⅓ "
Kansas	59,178	48,026	11,152	....	not comp'te	....
	10,795,422	10,466,768	422,618	93,964	1,823,572	....

Average ratio of enrolment to male population, 19 4/10 per cent.

It will be seen from this table that the States showing the larger ratios of enrolment to male population are—

1st. Those to which the more recent immigration has been most considerable, having in view immigration both from foreign countries and that resulting from the movement from the Atlantic States westward. Under this head, Indiana, Illinois, Michigan, Wisconsin, Iowa, and Minnesota are examples.

2d. Those States having large cities, to which able-bodied men resort for employment, especially those near the depots of foreign immigration, in which males from abroad remain upon landing, or to which they most readily find their way. New Jersey, in which the ratio of enrolment to male population is 20 per cent., is an example of this, its cities and manufacturing towns—Newark, Jersey City, Trenton, &c.—furnishing employment for the unskilled labor of immigrants, as well as to the "journeymen" class of the native population. The State of New York also is a more remarkable instance under this head. That State contains the chief depot of foreign immigration, and, as well, a metropolitan district with a population of more than a million, to which men in the prime of life are attracted from neighboring States.

The States showing the smallest percentage of enrolment with reference to male population are those most strictly rural, such as New Hampshire, 16¾ per cent.; Vermont, 15 per cent.; Delaware, 14¾ per cent.; these at the same time being States which are but slightly affected by the waves of foreign immigration, while they are also States which men within the ages of the enrolment of the first class are wont to leave for the more attractive fields of the west.

The District of Columbia exhibits in the table an apparent anomaly, more than half of the male population being enrolled in Class I. It will be remembered, however, that the figures of the population are those of the census of 1860. In the interval between the census and the enrolment the population has largely increased, and especially large numbers of enrollable men have been brought to the District by the civil and semi-military employments incident to the military operations around it.

Comparisons suggested by the foregoing table will serve to answer, in part, complaints based upon assumptions of negligent or overzealous enrolments in this or that part of the country. Discrepancies assumed to exist as based upon the figures of the population in gross, or upon the Congressional apportionment, will be reconciled by analysis of the population with reference to ages, sex, and employments, the observer keeping in view the currents of immigration, and bearing in mind that, from the nature of things, the migrating population always embraces a preponderance of precisely those whom the enrolment of the first class has registered; that is to say, men from the age of 20 to 35, and unmarried men beyond that age to 45.

Regulations for the government of the Bureau of the Provost Marshal General of the United States.

[Extract.]

* * * * * * * * *

85. The following diseases and infirmities are those which disqualify for military service, and for which, only, drafted men are to be "rejected as physically or mentally unfit for the service," viz:

1. Manifest imbecility or insanity.
2. Epilepsy. For this disability the statement of the drafted man is insufficient, and the fact must be established by the duly attested affidavit of a physician, of good standing, who has attended him in a convulsion.
3. Paralysis, general, or of one limb, or chorea; their existence to be adequately determined.
4. Acute or organic diseases of the brain or spinal chord; of the heart or lungs; of the stomach or intestines; of the liver or spleen; of the kidneys or bladder, sufficient to have impaired the general health, or so well marked as to leave no reasonable doubt of the man's incapacity for military service.
5. Confirmed consumption; cancer; aneurism of the large arteries.
6. Inveterate and extensive disease of the skin, which will necessarily impair his efficiency as a soldier.
7. Decided feebleness of constitution, whether natural or acquired.
8. Scrofula or constitutional syphilis, which has resisted treatment and seriously impaired his general health.
9. Habitual and confirmed intemperance or solitary vice, in degree sufficient to have materially enfeebled the constitution.
10. Chronic rheumatism, unless manifested by positive change of structure, wasting of the affected limb, or puffiness or distortion of the joints, does not exempt. Impaired motion of joints and contraction of the limbs alleged to arise from rheumatism, and in which the nutrition of the limb is not manifestly impaired, are to be proved by examination while in a state of anæsthesis induced by ether only.
11. Pain, whether simulating headache, neuralgia in any of its forms, rheumatism, lumbago, or affections of the muscles, bones, or joints, is a symptom of disease so easily pretended that it is not to be admitted as a cause for exemption

unless accompanied with manifest derangement of the general health, wasting of a limb, or other positive sign of disqualifying local disease.

12. Great injuries or diseases of the skull, occasioning impairment of the intellectual faculties, epilepsy, or other manifest nervous or spasmodic symptoms.

13. Total loss of sight; loss of sight of right eye; cataract; loss of crystalline lens of right eye.

14. Other serious diseases of the eye affecting its integrity and use; *e. g.*, chronic ophthalmia, fistula lachrymalis, ptosis, (if real,) ectropion, entropion, &c. Myopia, unless very decided or depending upon some structural change in the eye, is not a cause for exemption.

15. Loss of nose; deformity of nose so great as seriously to obstruct respiration; ozæna, dependent upon caries in progress.

16. Complete deafness. This disability must not be admitted on the mere statement of the drafted man, but must be proved by the existence of positive disease, or by other satisfactory evidence. Purulent otorrhœa.

17. Caries of the superior or inferior maxilla, of the nasal or palate bones, if in progress; cleft palate, (bony;) extensive loss of substance of the cheeks, or salivary fistula.

18. Dumbness; permanent loss of voice; not to be admitted without clear and satisfactory proof.

19. Total loss of tongue; mutilation or partial loss of tongue, provided the mutilation be extensive enough to interfere with the necessary use of the organ.

20. Hypertrophy or atrophy of the tongue, sufficient in degree to impair speech or deglutition; obstinate chronic ulceration of the tongue.

21. Stammering, if excessive and confirmed; to be established by satisfactory evidence, under oath.

22. Loss of a sufficient number of teeth to prevent proper mastication of food and tearing the cartridge.

23. Incurable deformities, or loss of part of either jaw, hindering biting of the cartridge, or proper mastication, or greatly injuring speech; anchylosis of lower jaw.

24. Tumors of the neck, impeding respiration or deglutition; fistula of larynx or trachea; torticollis, if of long standing and well marked.

25. Deformity of the chest sufficient to impede respiration, or to prevent the carrying of arms and military equipments; caries of the ribs.

26. Deficient amplitude and power of expansion of chest. A man five feet three inches (minimum standard height for the regular army) should not measure less than thirty inches in circumference immediately above the nipples, and have an expansive mobility of not less than two inches.

27. Abdomen grossly protuberant; excessive obesity; hernia, either inguinal or femoral.

28. Artificial anus; stricture of the rectum; prolapsus ani. Fistula in ano is not a positive disqualification, but may be so if extensive, or complicated with visceral disease.

29. Old and ulcerated internal hæmorrhoids, if in degree sufficient to impair the man's efficiency. External hæmorrhoids are no cause for exemption.

30. Total loss or nearly total loss of penis; epispadia or hypospadia at the middle or near the root of the penis.

31. Incurable permanent organic stricture of the urethra, in which the urine is passed drop by drop, or which is complicated by disease of the bladder; urinary fistula. Recent or spasmodic stricture of the urethra does not exempt.

32. Incontinence of urine, being a disease frequently feigned and of rare occurrence, is not of itself a cause for exemption. Stone in the bladder, ascertained by the introduction of the metallic catheter, is a positive disqualification.

33. Loss or complete atrophy of both testicles from any cause; permanent

retention of one or both testicles within the inguinal canal; but voluntary retraction does not exempt.

34. Confirmed or malignant sarcocele; hydrocele, if complicated with organic disease of the testicle. Variocele and cirsocele are not, in themselves, disqualifying.

35. Excessive anterior or posterior curvature of the spine; caries of the spine.

36. Loss of an arm, forearm, hand, thigh, leg or foot.

37. Wounds, fractures, tumors, atrophy of a limb, or chronic diseases of the joints or bones, that would impede marching or prevent continuous muscular exertion.

38. Anchylosis or irreducible dislocation of the shoulder, elbow, wrist, hip, knee, or ankle joint.

39. Muscular or cutaneous contractions from wounds or burns, in degree sufficient to prevent useful motion of a limb.

40. Total loss of a thumb; loss of ungual phalanx of a right thumb.

41. Total loss of any two fingers of same hand.

42. Total loss of index finger of right hand.

43. Loss of the first and second phalanges of the fingers of the right hand.

44. Permanent extension or permanent contraction of any finger except the little finger; all the fingers adherent or united.

45. Total loss of either great toe; loss of any three toes on the same foot; all the toes joined together.

46. The great toe crossing the other toes with great prominence of the articulation of the metatarsal bone and first phalanx of the great toe.

47. Overriding or superposition of all the toes.

48. Permanent retraction of the last phalanx of one of the toes, so that the free border of the nail bears upon the ground; or flexion at a right angle of the first phalanx of a toe upon a second, with anchylosis of the articulation.

49. Club feet; splay feet, where the arch is so far effaced that the tuberosity of the scaphoid bone touches the ground and the line of station runs along the whole internal border of the foot, with great prominence of the inner ankle; but ordinary large, ill-shaped, or flat feet do not exempt.

50. Varicose veins of inferior extremities, if large and numerous, having clusters of knots, and accompanied with chronic swelling and ulcerations.

51. Chronic ulcers; extensive, deep, and adherent cicatrices of lower extremities.

Circular, No. 100. } WAR DEPARTMENT, PROVOST MARSHAL GENERAL'S OFFICE,
Washington, November 9, 1863.

Paragraph 85 of the regulations for the government of the bureau of the Provost Marshal General of the United States is amended to read as follows:

85. The following diseases and infirmities are those which disqualify for military service, and for which, only, drafted men are to be "rejected as physically or mentally unfit for the service," viz:

1. Manifest imbecility.

2. Insanity. This includes well-established recent insanity, with liability to a recurrence.

3. Epilepsy. For this disability the statement of the drafted man is insufficient, and the fact must be established by the duly attested affidavit of a physician in good standing, who has attended him in the disease within the six months immediately preceding his examination by the board.

4. Paralysis, general, or of one limb, or chorea; their existence to be adequately determined. Decided atrophy of a limb.

5. Acute or organic diseases of the brain or spinal cord; of the heart or lungs; of the liver or spleen; of the kidneys or bladder, which have so seriously impaired his general health as to leave no doubt of the man's incapacity for military service.

6. Confirmed consumption. Incipient consumption does not exempt.

7. Cancer; aneurism of the large arteries.

8. Inveterate and extensive disease of the skin, such as will necessarily impair his efficiency as a soldier.

9. Decided feebleness of constitution, or deficient size of chest, sufficient in degree to leave no doubt of the man's unfitness for military service.

10. Scrofula, or constitutional syphilis, which has so seriously impaired his general health as to leave no doubt of the man's incapacity for military service.

11. Habitual and confirmed intemperance, or solitary vice, which has so materially enfeebled the constitution as to leave no doubt of the man's incapacity for military service.

12. Chronic rheumatism, unless manifested by positive change of structure, wasting of the affected limb, or puffiness or distortion of the joints, does not exempt. Impaired motion of joints and contraction of the limbs alleged to arise from rheumatism, and in which the nutrition of the limb is not manifestly impaired, are to be proved by examination while in a state of anæthesis induced by ether only.

13. Pain, whether simulating headache, neuralgia in any of its forms, rheumatism, lumbago, or affections of the muscles, bones, or joints, is a symptom of disease so easily pretended that it is not to be admitted as a cause for exemption unless accompanied with manifest derangement of the general health, wasting of a limb, or other positive sign of disqualifying local disease.

14. Great injuries or diseases of the skull, occasioning impairment of the intellectual faculties, epilepsy, or other manifest nervous or spasmodic symptoms.

15. Total loss of sight; total loss of sight of right eye; cataract of right eye; loss of crystalline lens of right eye.

16. Partial loss of sight of both eyes, vision being so greatly impaired as to leave no doubt of the man's inability to perform military duty. Serious permanent diseases of the eye or eyelids, so manifestly affecting the use of the eyes as to leave no doubt of the man's incapacity for military service. Near-sightedness does not exempt; if found on trial to be so decided as to incapacitate for field service, the man may be transferred to the Invalid Corps.

17. Total loss of nose; deformity of nose so great as seriously to obstruct respiration; ozæna, dependent on caries in progress.

18. Decided deafness. This disability must not be admitted on the mere statement of the drafted man, but must be proved by the existence of positive disease, or by other satisfactory evidence; and it must be so decided as to leave no doubt of the man's unfitness for military service. Chronic purulent otorrhœa.

19. Incurable diseases or deformities of either jaw, such as will necessarily greatly impede mastication or speech. Anchylosis of the lower jaw; caries of the bones of the face, if in progress; cleft palate, (bony;) extensive loss of substance of the cheeks, or salivary fistula.

20. Dumbness; permanent loss of voice; not to be admitted without clear and satisfactory proof.

21. Total loss of tongue; hypertrophy, atrophy, mutilation, or obstinate chronic ulceration of the tongue, if sufficient in degree to interfere seriously with the use of the organ.

22. Stammering, if excessive and confirmed; to be established by satisfactory evidence under oath.

23. Loss of a sufficient number of teeth to prevent mastication of food.

This applies to those cases only where the loss of teeth is so great that if the man were restricted to solid food, he would soon become incapacitated for military service.

24. Tumors or wounds of the neck, impeding respiration or deglutition; fistula of larynx or trachea; torticollis, if of long standing and well marked.

25. Deformity of the chest, or excessive curvature of the spine, sufficient to prevent the carrying of arms and military equipments; caries of the spine, ribs, or sternum.

26. Abdomen grossly protuberant; excessive obesity.

27. Hernia.

28 .Artificial anus; stricture of the rectum; prolapsus ani. Fistula in ano is not a positive disqualification, but may be so, if extensive or complicated with visceral disease.

29. Old and ulcerated internal hæmorrhoids, if in degree sufficient to impair the man's efficiency. External hæmorrhoids are no cause for exemption.

30. Total loss or nearly total loss of penis; epispadia or hypospadia at the middle or near the root of the penis.

31. Incurable permanent organic stricture of the urethra, in which the urine is passed drop by drop, or which is complicated by disease of the bladder; urinary fistula. Recent or spasmodic stricture of the urethra does not exempt.

32. Incontinence of urine, being a disease frequently feigned and of rare occurrence, is not, of itself, a cause for exemption. Stone in the bladder, ascertained by the introduction of the metallic catheter, is a positive disqualification.

33. Loss or complete atrophy of both testicles from any cause; permanent retention of one or both testicles within the inguinal canal; but voluntary retraction does not exempt.

34. Confirmed or malignant sarcocele; hydrocele, if complicated with organic disease of the testicle. Varicocele is not, in itself disqualifying.

35. Loss of an arm, forearm, hand, thigh, leg, or foot.

36. Wounds, muscular or cutaneous contractions from wounds or burns, or tumors, which would prevent marching, or otherwise manifestly incapacitate the man for military service.

37. Fractures, irreducible dislocations or anchylosis of the large joints, or chronic diseases of the joints or bones, that would prevent marching, or otherwise unfit the man for military service.

38. Total loss of a thumb; total loss of the index finger of the right hand. Other permanent defects or deformities of the hands, so decided as to leave no doubt of the man's incapacity for military service.

39. Club feet; total loss of a great toe. Other permanent defects or deformities of the feet, such as will necessarily prevent marching.

40. Varicose veins of inferior extremities, if large and numerous, and accompanied with chronic swellings or ulcerations.

41. Chronic ulcers; extensive, deep, and adherent cicatrices of lower extremities.

Surgeons of boards of enrolment, in reporting "the statistics of the causes of exemption on account of physical disability," will hereafter, in addition to the alphabetical list of disabilities required by circular No. 90, from this office, report the number rejected under each paragraph of the above list of disqualifying infirmities.

JAMES B. FRY,
Provost Marshal General.

Report of General Hitchcock, commissioner for the exchange of prisoners.

WASHINGTON CITY, D. C., *November* 30, 1863.

SIR: On the 4th instant, I had the honor to address a letter to you, of which I annex herewith a copy, marked A, on the subject of our citizens held in southern prisons, particularly in Richmond, in which I stated, and desire now to repeat, that the principal reason why I have not been able to obtain the release of those citizens has been that the rebel authorities have been endeavoring to compel the government of the United States to enter into some sort of a cartel or treaty, by which, under the pretence of exempting citizens from arrest, *rebels* would be placed on a footing with *citizens*, and, in fact, a complete equality of the so-called Confederate States, with the United States, would be acknowledged.

On the 8th of October last, General Meredith addressed me a letter from Fortress Monroe, on the subject of our citizen prisoners in Richmond, of which a copy, marked B, is annexed; by which it will be seen that Mr. Ould, the rebel agent, had expressly declared that he would "not make any special exchanges, but that he was willing to make any arrangement which will be at all *reciprocal*, and he expressed himself perfectly willing to *join* in any *general* principle of exchange;" and the purpose of Mr. Ould, or of his authorities, is declared in the passage immediately following, to wit: "In this connexion I will state, (says General Meredith,) that Mr. Ould informed me that the object of the rebel authorities in arresting citizens was a retaliatory measure, and for the purpose of bringing to bear such a *pressure* on the United States authorities as to cause them to refrain from making more arrests of sympathizers with the south."

It will be seen at a glance that Mr. Ould refused to act upon the assurance of General Meredith, that we hold no citizen in confinement on the ground of his being a citizen of the south, but only because of some reason of state; that is, of public safety.

I have not hitherto considered citizens as proper subjects of *exchange*, but of *release*, when not held for reasons of public safety, although I have done everything in my power to afford relief to citizens suffering under the policy adopted by the rebel authorities, by which they are attempting to force the government of the United States to one of two results, to wit: either to acknowledge the perfect equality of *rebels* with *citizens*, or resort to a war upon citizens in imitation of their barbarous example.

The difficulties on the subject of the exchange of prisoners of war are somewhat complicated, but the vital difficulty is this:

The government of the United States, by a formal act, authorized the employment of colored troops in the army; and by that fact bound itself in the most solemn manner, in the eyes of history and of the world, to imbody that class of troops as an integral portion of the whole army; entitled, in all respects, to the privileges and the protection of the laws of war. This point admits of no question, and will permit no debate calculated to jeopard the claim of that class of troops to be treated in all respects upon an equality with other troops employed in the suppression of the rebellion.

As soon as the policy of the government was announced on this subject, the rebel authorities proclaimed, through their president, and through other powers of their so-called confederate government, that they would make a distinction against such of the colored troops as might fall into their hands, by which the officers serving with such troops should be delivered over to the State authorities, to be tried under State laws for the crime of inciting servile insurrection, while the colored soldiers themselves were to be either returned or sold into slavery.

If this fate has not fallen upon any of the officers who may have been taken prisoners while serving with colored troops, it is because they have been disposed of in some, if possible, more barbarous manner. As soon as the purposes of the rebel authorities became known, an order was sent by the President to our commanders in the field not to grant paroles, and to make no exchanges, without orders from the War Department.

The necessity for this order is too manifest to require explanation; and its existence in full force should continue until the rebel authorities will hold themselves in readiness to exchange captured colored troops, or officers serving with them, grade for grade, and man for man, in common with all other troops; those first captured being entitled to the first consideration in the question of exchange.

There have been very serious difficulties on the subject of the declaration of exchange of paroled prisoners, but these are of a totally different character from the one just stated. These difficulties would not, of themselves, have seriously interrupted the system of exchange under the cartel, turning chiefly as they have on questions touching the validity of certain paroles, according to the laws of war. By the legitimate course of events, there fell into the hands of the United States a very large excess of prisoners over those held by the rebels; at one period there being in the power of the government about twenty-five hundred rebel commissioned officers and about seventy thousand rank and file, thus held by the government. This number, however, included the prisoners paroled by General Grant by the terms of the capitulation at the surrender of Vicksburg, the authority for which, on the part of General Grant, existed independently of any general order, according to the usages of war; and it included also some several thousand men captured by General Banks at the unconditional surrender of Port Hudson, who were paroled at Mobile by special agreement between General Banks and the rebel commander; amounting in all to some thirty-eight thousand prisoners.

This state of things no doubt became a subject of serious alarm to the rebels, and they determined to employ guerilla parties, scattered over parts of Kentucky, Tennessee, Missouri, Mississippi, and elsewhere, wherever they could stealthily penetrate, and arrest individuals in many cases, as we have reason to believe, without any pretence even of their having been in arms, and put them under some form of parole, and then call them and count them as paroled prisoners of war. After this work had been going on some time, and the rebels had accumulated a considerable number of these so-called prisoners on parole, the effort was made to turn them to account.

Mr. Ould, the rebel agent of exchange, had delivered at City Point several thousand prisoners according to usage; and in conformity with the terms of the cartel, he had the right to discharge from their porole a corresponding number of his own men, furnishing, proper lists, &c., as required by the cartel. If he had pursued this course, no exceptions could have been taken to his conduct.

But this open, fair course would not answer his purpose; by this course the guerilla captures of citizens in the west and southwest could not have been made available.

To carry his point, therefore, he determined to disregard the cartel, and he suddenly, and without any proper conference with General Meredith, sent a written notice to General Meredith, that on the next day after the date of the notice he would declare exchanged a large portion of the prisoners captured and paroled by General Grant, referring to them, however, by corps, regiments, &c., not furnishing any list by which the number he proposed thus to free from parole could be definitely ascertained.

When his declaration was made, no list was furnished, and, as in his notice to General Meredith, the declaration extended to corps, divisions, brigades, &c.

On consulting the reports made by General Grant, where the divisions, &c., were designated, and the strength of each respectively given, it was ascertained that Mr. Ould had actually declared exchanged, and free from their parole, more than he had any proper claim for, in the ratio of 3 for 2, or one-third more than he was entitled to.

Mr. Ould had, however, invited General Meredith to make a corresponding declaration of equivalents, which would have been according to the cartel, if Mr. Ould had not in his declaration exceeded the number of paroled prisoners, who had been delivered properly under the cartel. This gave the right to General Meredith to make a declaration of exchange, which was accordingly made and published, but Mr. Ould was informed of his irregularity, and a demand was made upon him for the delivery of Colonel Straight, &c., &c., as absolutely due to us.

Mr. Ould denied the right of General Meredith to make this demand, and insisted that we owed him, though to us this was inconceivable upon the facts known to us, and Mr. Ould was called upon for explanations. At length, after making further declarations of exchange, on the part of Mr. Ould, he furnished what purported to be a tabular statement of what he called "valid paroles," amounting to over 18,000, which, on the face of it, carried indisputable evidence of the fact that it had been the deliberate work of guerilla parties, acting over districts of the country for the most part occupied by peaceable citizens, who were put under some kind of oath to keep the peace; and these we were expected to count as soldiers captured in war, according to the laws of war.

This tabular statement we refused to consider as a valid paper, and there the subject remains for the present.

The paroling of several thousand men at Mobile by General Banks, captured principally at Port Hudson, has been made an occasion for raising a question, which Mr. Ould, agent for exchange from Richmond, after making the question, has taken upon himself to decide without any authority whatever. Mr. Ould is simply an agent for the exchange of prisoners under an agreed upon cartel, signed by General Dix and General Hill, acting by authority. Mr. Ould has no powers under the cartel, but such as are named in the cartel itself, for the execution of its provisions.

The cartel provided two places for the delivery of prisoners of war—City Point, on James river, and Vicksburg, on the Mississippi; but contemplated other places *when the exigencies of war might make it necessary.*

The capture of Vicksburg by the United States troops made the exigency contemplated by the cartel. General Banks, subsequently to the capture of Vicksburg, received several thousand prisoners at Port Hudson, unconditionally surrendered, which were, to use the language of the cartel, "reduced to possession." What was he to do with them? They were completely in his possession, and he could have shipped them to the north either by the river Mississippi, or by sea, by the way of New Orleans. He could not deliver them at Vicksburg, for the reason just stated. In this state of things he made an agreement with the rebel commander to deliver them at Mobile on parole, and that commander, in agreeing to this delivery, undoubtedly took upon himself an obligation and bound his government in honor to protect those men in their parole, and was bound not to allow them to take arms until exchanged.

If there was any question as to the propriety of the arrangement, (properly speaking it was a deliberate contract between two generals in the field,) it was a question for the governments to decide. It was a unique case, not at all coming under the rules of any previous practice, for there had been nothing like it; but Mr. Ould, apparently upon his own motion, on the 10th of October declared all of those troops (delivered at Mobile) under no obligation to observe their paroles, their delivery not having been made at City Point. He does not deny that their capture was complete, and that they were in the actual possession of General Banks. He cannot deny that Vicksburg, one of the two points designated in the cartel as points of delivery, had passed out of the rebel hands, making a contingency contemplated in the cartel itself, upon which another place might be "agreed upon." General Banks made an *agreement* with the rebel general to deliver his prisoners at Mobile, and they were accordingly paroled at Mobile.

That they were paroled in good faith, and were received in good faith by the rebel general, there can be no doubt. It is not a supposable case that either of the parties in the transaction could have acted in ignorance of the cartel, and much less with deliberate bad faith.

While Mr. Ould would thus free from the obligation of their parole several thousand men, whom every honorable man will say ought to be protected in their parole, he did not hesitate subsequently to require us to consider as properly paroled a number of the helpless sick and wounded of our men, whom General Lee was compelled to leave in the hospitals at Gettysburg, where some unauthorized rebel officer undertook informally to declare them *paroled.*

This class of paroles, made on the field of battle, where an enemy is unable to secure *possession* of the captured, is universally declared to be invalid. Troops cannot, in fact, be said to be captured when the enemy can neither secure them nor carry them away. With savages the rule might be different. Savages are expected, because they are savages, to murder helpless prisoners of war. But civilized warfare denounces the practice, and has established the rule that paroles are invalid when exacted under such circumstances.

It becomes my painful duty, in this report, to touch upon one other subject, which I would gladly pass over in silence if it were possible to do so. I refer to the treatment our men receive in the prisons of the south when captured.

The treatment of prisoners of war is a common topic of complaint between those engaged in war. It is not to be expected that prisoners of war shall uniformly receive the comforts of a camp life, much less those of a garrison life. The severe conditions of war make this next to impossible; but there are limits beyond which bad treatment cannot be permitted to go, without subjecting the party permitting or inflicting it to the condemnation of the civilized world. Some of our people in the Richmond prisons and at Belle Isle have been exposed to suffering to such a degree, that the terms *shocking, cruel, barbarous,* and *inhuman* become mild in characterizing it. History can hardly furnish a parallel to it. They have died under the hands of the rebels from both the want of clothing and want of food.

I do not propose to multiply proofs of this, which I have in fearful abundance, and will content myself with reciting two or three documents, including the report of a medical officer upon the condition of a small party of paroled prisoners received at the parole camp at Annapolis directly from Richmond.

The report is as follows:

UNITED STATES GENERAL HOSPITAL DIVISION NO. 1,
Annapolis, Md., November 2, 1863.

SIR: I have the honor to make the following general report of the condition of patients (sick and wounded) who arrived at and were admitted to this hospital from "Belle island," Virginia, per flag of truce steamer "New York," via City Point, Virginia, the 29th ultimo.

The "New York" left "City Point" with one hundred and eighty-nine sick and wounded. Before she arrived at Fortress Monroe four died; on the trip from Fortress Monroe to this place four more died, leaving one hundred and eighty-one to be admitted.

To express fully the condition of this number, language is almost inadequate, and none but those who saw them can have any appreciable idea of their condition. I do not pretend to particularize, for every case wore upon it the visage of hunger, the expression of despair, and exhibited the ravages of some preying disease within, or the wreck of a once athletic frame. I only generalize them when I say their external appearance was wretched in the extreme. Many had no hats or shoes; but few had a whole garment; many were clothed merely with a tattered blouse, or the remnant of a coat, and a poor apology for a shirt; some had no under clothing, and I believe none had a blanket. Their hair was dishevelled, their beards long and matted with dirt, their skin blackened and caked with the most loathsome filth, and their bodies and clothing covered with vermin. Their frames were, in the most cases, all that was left of them; a majority had scarcely vitality sufficient to enable them to stand. Their dangling bony, attenuated arms and legs, sharp pinched features, ghastly cadaveric countenances, deep sepulchral eyes, and voices that could hardly be distinguished, (some could not articulate,) presented a picture which could not be looked upon without its drawing out the strangest emotions of pity. Upon those who had no wounds, as well as on those wounded, were large foul ulcers and sores, principally on their shoulders and hips, produced by lying on the hard ground; and those that were wounded had received no attention, their wounds being in a filthy, offensive condition, with dirty rags, such as they could procure, encrusted hard to them. One man who died on the trip from Fortress Monroe told the surgeon, previous to death, his wounds had not been dressed since the battle of Gettysburg, Pennsylvania, where he was wounded in the head, and both tables of the posterior part of the skull were fractured. A majority of the cases were suffering with diarrhœa, some of them with involuntary evacuations, their clothes being the only receptacle for them, and they too weak to remedy the difficulty. This being the case, you can, of course, imagine the stench emitted from them. Many had pneumonia in some form or stage; some were in the last stage, some gasping their last breath. Delirious with fever, many knew not their destination, or were not conscious of their arrival nearer home, or, racked with pain, many cared not whither they went, or considered whether life was dear or not. In some, life was slowly ebbing from mere exhaustion and the gradual wasting of the senses. How great must be the mortality, then, of these men, and how dreadful among those still suffering the pains of imprisonment.

Every man who could, rejoiced over his escape, deplored the scenes through which he had passed, and mourned the lot of those he left behind. Weak and debilitated, they wished but to die among their friends—a wish which, unfortunately, will be too nearly realized.

Very respectfully, your obedient servant,

S. J. RADCLIFF,
Assistant Surgeon United States Army,
Medical officer of the day.

Surgeon B. H. VANDERKAFT, U. S. A., *in charge.*

A true copy.

C. H. CRANE,
Surgeon U. S. A.

SURGEON GENERAL'S OFFICE,
November 9, 1863.

The following is an extract from a statement made by the Rev. John Hussey, delegate United States Christian Commission, bearing date November 7, 1863; the Rev. John Hussey having been recently returned from the Richmond prisons:

"I wish to add for myself—for I spent three days this week in one of the tobacco factories (Scott's) with about 160 privates, who were wounded at

Chickamauga mostly, and now nearly recovered, the others having been sent to Belle island—I wish to state how they fare.

"The rations are, for each man, 12 oz. of bread and 2 to 3 oz. of beef or mutton in 24 hours, given about one o'clock each day, and *nothing else.* No stoves, no fuel, no light at night, no soap. They have no bunks or straw, and very insufficient clothing and blankets; not one in four has a blanket. They have, very generally, bad colds, and cough incessantly. They are not allowed to purchase anything; what they get is got by stealth from the guard, who charge them two or three prices for everything they buy for them.

"I paid $1 for a small 6 oz. loaf, but they usually get such a loaf for fifty cents, which is double the price out in the city for bread a little smaller. But the most of the privates were robbed of their money, and have to live on their rations. So much for the private soldier."

"The following is the substance of what [the names referred to by the Rev. Mr. Hussey are omitted, because the officers are still prisoners in Richmond, and it could do them no good should a publication of them by any chance reach Richmond] generally desired me to communicate to you, in relation to the comparative treatment they and the rebel officers in the north receive. From notes of his conversation "we receive 12 oz. of bread daily, half a gill of rice, 4 oz. of meat, vinegar and salt, one tallow candle to each room, containing from 175 to 200 officers. They furnish stoves only for cooking purposes, and scarcely sufficient; we have to furnish our own cooking and table utensils; have to do our own cooking, and rise very early, and then have no means of cooking more than two meals a day. We sleep on the floor without blankets, (except as our government furnishes them to us;) are kept in close confinement, in closely packed rooms, dark, deep, and insufficiently ventilated, though our windows have no glass in them.'

"Now we protest against the treatment their officers receive from our government, and we ask that they be placed in similar position until we and our men are better treated. They would have sent a petition signed by every officer, but I thought it not safe to undertake to bring it through.

"They do not ask our government to retaliate on the private soldier in captivity, but upon the officers.

"Let me add, the officers who return south, whether they escape, or are released as the chaplains recently, almost uniformly misrepresent the treatment they receive, and from it justify the treatment our officers receive.

"JOHN HUSSEY,
"*Delegate United States Christian Commission.*"

Rumors of this inhuman treatment had reached here in one form or another, but for a length of time no definite or authentic information could be obtained.

When it was stated that the provisions furnished to the prisoners were both insufficient in quantity and bad in quality, it was usually asserted that it was as good as the rebel soldiers themselves received; and when it came to be tolerably certain that it was unendurable, that it was the best within the power of the rebel government to furnish.

As soon, however, as the information became at all definite and reliable, the Secretary of War at first ordered a quantity of blankets to be sent for distribution to the prisoners, assurances having been obtained from the rebel agent that they would be delivered. But the reports grew worse, and that very suddenly, taking both the government and the country by surprise, until the truth was unveiled that our men in Richmond prisons, and at Belle Isle, were freezing to death, and dying from starvation. Immediately, large supplies of both clothing and provisions were ordered by telegraph to be sent from Fort Monroe to City Point, the rebel agent causing a little delay by refusing to allow our agent to go with the supplies to superintend their delivery, but offering to have them delivered by the rebel commissaries.

The Secretary of War threw aside all ceremonies, and ordered the supplies to be delivered to the rebel commissaries, and large supplies have thus been committed to the fidelity of the agents with whom we are at open war. Humanity would allow no other course.

With the authority of the Secretary of War, I thought it necessary to address the following letter on the 13th instant to General Meredith, to be communicated to the rebel authorities, to which I have as yet, probably for want of time, received no response:

WASHINGTON CITY, D. C.,
November 13, 1863.

SIR: I am not yet informed whether any or how far relief may have reached our unfortunate prisoners of war in Richmond and its vicinity, under the order of the Secretary of War to send supplies to them of both food and clothing.

Meantime it is proper and necessary that Mr. Ould should be notified, for the information of his government, that whatever steps may have been, or may be taken, thus to extend relief, must on no consideration be appealed to by the enemy to relieve him from the obligations to treat prisoners of war according to the laws of civilized warfare. If, in other words, our prisoners in Richmond fail to receive such supplies as the laws alike of humanity and war require, the authorities in Richmond must be informed that it will not be considered a valid explanation or excuse for them to appeal to the fact, should it exist, that supplies from us have not reached them.

The action of our government in this matter is dictated purely by humanity, and is only an effort to relieve our prisoners from suffering inflicted upon them contrary to the claims of both humanity and the laws of war, and must not be understood as relieving the authorities at Richmond from responsibility to the Christian world in the premises.

If the authorities in Richmond will send us those prisoners, we will not only feed and clothe them, but will continue to supply food and clothing, as heretofore, to such prisoners as may be in our possession; and you will propose to Mr. Ould that, in this case, we will agree, without any reserve, to respect the parole they may give according to the laws of war, from which they shall not be relieved in view of past differences or pending questions on the subject of exchange, without the previously obtained consent of the authority represented by Mr. Ould, as agent for exchange under the cartel.

You will please lose no time in communicating a copy of this note, certified by yourself, to Mr. Ould, and will urge upon him its acceptance as due to the most solemn considerations in the face of the civilized world.

Very respectfully, your obedient servant,

E. A. HITCHCOCK,
Maj. Gen. of Volunteers, Commissioner for Exchange of Prisoners.

Brigadier General S. A. MEREDITH,
Commissioner for Exchange of Prisoners.

This note to General Meredith, to be transmitted to Mr. Ould, was written in the charitable hope that the starvation of our prisoners in Richmond might have resulted in part, if not wholly, from an actual inability on the part of the rebel authorities to provide the supplies they were bound, in honor and humanity, to furnish the prisoners, and that, by a bare possibility, they might avail themselves of the offer to relieve themselves from being publicly exposed to the gravest accusations. It was my wish, also, not to omit anything which offered the least, though ever so slight, prospect of affording relief to our prisoners.

I ought to mention the fact, to the honor of our people, both at home and in the prisons, that the moment it became known to our citizens that our prisoners were suffering, offers of assistance came in from all quarters—from sanitary commissions and Christian associations, as also from various business firms and newspaper establishments, and from great numbers of individuals, tendering their sympathies and their services, their hearts and their purses, while many of the suffering prisoners themselves, to their infinite honor, without fully understanding the circumstances in the way of their exchange and release, found means to express themselves willing to endure any amount of suffering rather than that the government should compromise any principle involved in this war. And here I must remark that this noble, self-sacrificing spirit has been conspicuous among the class of citizen prisoners who have been ruthlessly seized and incarcerated by the insane authorities of the south in the vain hope of forcing the government into concessions. But the sole effect of this wretched policy has been to inspire the people with patriotism, and with a detestation of tyranny, affording assurance that a great principle is at work in the midst of these horrors, whose mission it is to preserve republican government among us, and no local institution will be permitted to crush or destroy it.

It is proper to state in this report that while our prisoners in the south, especially in Richmond, have been subjected to every sort of privation and suffering, through the agents of the rebel authorities, if not by their countenance, the rebel prisoners in our hands have everywhere been provided with comfortable barracks, except at one single depot—that at Point Lookout—where the prisoners are accommodated with good tents, which, as every soldier knows, are easily made comfortable, and are always thankfully received by troops in the field. At Camp Chase, Ohio; Camp Morton, Indiana; Camp Douglas, Illinois; at Rick island, on the Mississippi, there are good, comfortable barracks for all of the prisoners; and the rebel officers, who, for greater safety, it has been judged expedient to send to Johnson's island, near Sandusky, Ohio, are amply provided with comfortable winter quarters, with an abundance of fuel; and at all of our prison depots the prisoners are not only comfortably clad, but they receive each a full army ration from the commissary department, including both coffee and sugar.

Whilst engaged in preparing this report I have felt called upon to address a letter to the editor of the New York Times, for the purpose of placing before the public a true statement of the causes which have suspended exchanges of prisoners of war, a copy of which, marked C, I annex to this report, in further explanation of that subject.

I also annex hereto a communication from Colonel Hoffman, commissary general of prisoners, of the 30th instant, enclosing a report of prisoners of war exchanged and in custody during the past year.

I have the honor to be, very respectfully, your obedient servant,

E. A. HITCHCOCK,

Maj Gen. of Volunteers, Commissioner for Exchange of Prisoners.

Hon. EDWIN M. STANTON,
Secretary of War.

A.

WASHINGTON CITY, D. C.,
November 4, 1863.

SIR: I have the honor to state that several applications have been addressed to me, having in view the exchange of *citizens*, as prisoners. I have exhausted my efforts by correspondence to induce the enemy to discharge our citizens, held as such, by assurances that we do not hold in confinement any citizen on the ground that he is simply a citizen of the south, but in all cases when arrests have been ordered, it has been for some special cause. Mr. Ould, the agent, refuses to discharge our citizens, holding them without any pretence of accusation against them, his object being, professedly, to create such a "pressure" upon our "people," as shall compel the government to enter into a sort of *cartel* on this subject, by which this government would obligate itself to make no arrests of citizens at all, or to hold parties in arrest only under circumstances that would virtually be dictated by the rebels. The visible object of this proposal by Mr. Ould (or his government) is to place the rebels of the south, in all respects, on a footing with citizens of the north, by which the government would relinquish all right to arrest any traitor engaged in the rebellion, unless taken in arms.

I have not supposed that the government can listen to such a proposal.

Meanwhile many of our citizens are suffering in southern prisons, and the question remains, how are they to be relieved?

One method seems obvious to many who refer to it, verbally and by letters, to wit: that of arresting citizens in the south, in sympathy with the rebels, to be exchanged for Union men. This seems to be a first thought with many; but a serious objection to it is, that the war, instead of being carried on against organized opposition to the government, would immediately degenerate into a war against citizens, resulting in an amount of suffering frightful to contemplate, by which the character of the country for civilization and humanity would be hopelessly compromised.

I am not prepared to recommend this course, but I feel called upon to bring this subject particularly to your notice, for such disposition as you may direct.

I have the honor to be, very respectfully, your obedient servant,

E. A. HITCHCOCK,
Maj. Gen. Volunteers, Commissioner for Exchange of Prisoners.

Hon. EDWIN M. STANTON,
Secretary of War.

B.

FORTRESS MONROE, VA.,
October 8, 1863.

SIR: In accordance with the instructions contained in your letter of the 5th instant, I submitted the letters from S. D. Culbertson and A. McInnes, esq., therein enclosed, to Mr. Ould, informing him that we knew of no prisoners in our hands held under similar circumstances, and inviting him, if he knew of any, to name them, and make a mutual exchange. I explained to Mr. Ould that the United States authorities did not hold any person a prisoner on the ground that he was a citizen of the south, but always for some special cause. I also informed him that if he could not name any, that within twenty-four hours after any given time, the United States authorities could seize any required number of secessionists in the south, to be exchanged for those referred to. Mr. Ould, in reply, stated, that notwithstanding he would not make any special exchange, he was willing to make any arrangement which will be at all reciprocal, and he expressed himself perfectly willing to join in any *general* principle of exchange. In this connexion I will state, that Mr. Ould informed me that the object of the rebel authorities in arresting citizens was a retaliatory measure, and for the purpose of bringing to bear such a pressure on the United States authorities as to cause them to refrain from making more arrests of sympathisers with the south.

I am, general, very respectfully, your obedient servant,

S. A. MEREDITH,
Brigadier General, and Commissioner for Exchange.

Major General E. A. Hitchcock,
Commissioner of Exchanges, Washington, D. C.

C.

[From the New York Times, December 2, 1863.]

EXCHANGE OF PRISONERS.—STATEMENT BY MAJOR GENERAL HITCHCOCK.

Why the exchange was stopped—Rebel subterfuges and quibbling—The disposition made of colored soldiers and their white officers.

Washington City, *November* 28, 1863.

To the Editor of the New York Times:

The public appears to be in need of information on the subject of the exchange of prisoners of war. The condition of our men held as prisoners of war in Richmond, the extreme sufferings to which they have been subjected, contrary to the usages of war and the dictates of humanity, have naturally aroused the sympathies of our people, and the question is asked by many, why are they not exchanged?

I propose to furnish you a statement of facts, from which a judgment may be formed in answer to the question just stated.

On the 16th of January, of the present year, Colonel Ludlow, then stationed at Fortress Monroe as the agent of exchange under the cartel, which was published in September, 1862, addressed me a letter, forwarding a copy of the Richmond *Enquirer* of the 15th of that month, containing a message to the rebel congress from Jefferson Davis, referring to the proclamation of the President of the United States, dated the 1st of January, on the subject of slaves within certain designated portions of the United States. The denunciatory character of Mr. Davis's message, levelled against the proclamation of the President, and against the loyal people of the Union, will be remembered by most of your readers at this time. One passage in the message of Mr. Davis very clearly indicates the policy then determined upon in the south, expressed in these words:

"So far as regards the action of this government on such *criminals* as may attempt its execution, [referring to the proclamation of the President of the United States,] I confine myself to informing you that I shall, unless in your wisdom you deem some other course more expedient, deliver to the several State authorities all commissioned officers of the United States that may hereafter be captured by our forces, in any of the States embraced in the proclamation, that they may be dealt with in accordance with the laws of those States providing for the punishment of *criminals* engaged in exciting servile insurrection."

Colonel Ludlow, in forwarding the message, gives an opinion in the following words:

"His [Mr. Davis's] determination, avowed in most insolent terms, to deliver to the several State authorities all commissioned officers of the United States that may hereafter be captured, will, I think, be persevered in."

This opinion of Colonel Ludlow was, without doubt, well founded at the time, so far as the rebel authorities had the power or dared to put in force the threat of Mr. Davis, which met the approbation of the confederate congress; and I hazard nothing in saying that the sole reason why this threat has not been more openly executed in the south, has been the preponderance of northern power, as shown by the superior number of prisoners of war held in the north against those held in the south ; and if this inequality could now be neutralized, or if the south could succeed in capturing an excess of prisoners over those held in the north, not a moment would be lost by the rebel authorities in putting in force the threat of Mr. Davis. Whoever doubts this must be utterly ignorant of the spirit which animates those who are struggling in the south to destroy the union of the States, in behalf of a government whose corner-stone is slavery.

But the point thus stated will not be further insisted upon at this time, because whatever was the threatening character of Mr. Davis's declared purpose, as set out in his message, it has been thrown entirely into the shade by subsequent events, which are but just now being developed, growing out of the most solemn acts of the government of the United States.

It is generally known that when the Congress of the United States proceeded to authorize by law the employment of colored troops for the suppression of the rebellion, there was, throughout the whole length and breadth of the south, one universal cry of real or well-affected indignation, accompanied with the wildest threats of vengeance against such officers as might be captured with colored troops, while the colored soldiers themselves, it was everywhere declared, should be either "returned or sold into slavery." It was everywhere published throughout the south that this class of troops were not entitled to and should not receive the protection of the laws of war, and the strongest terms which infuriate madness could devise or invent were used in condemnation of the measure authorized by the United States government.

What has actually been done up to the present time in the south, in obedience to this spirit of vengeance so openly declared, it may be impossible to determine in detail, except in a few scattered instances; but it is a most significant fact that in no single instance has the smallest evidence come to light tending to show that any officer connected with colored troops has been captured alive and held in the south as a prisoner of war; nor has any colored man, employed as a soldier of the United States, been captured in the south and accounted for as a prisoner of war. To any reasonable man this glaring fact might be sufficient to show the fell purposes of the rebel authorities to countenance, if they have not directly ordered, the *destruction* of this class of troops whenever and wherever they unhappily fall into their power. From the nature of the case the evidence of the proceedings in the south, when characterized by the murder of colored troops and their white officers, can hardly be expected to reach the public through the confederate authorities, but we must look for them chiefly through indirect disclosures, such as may be found in a paragraph from a New York paper of a recent date, in the words following:

"REBEL BARBARITY.—The following is an extract from a letter dated Port Hudson, November 3, written by a captain in the seventh regiment, and addressed to his father in New York :

"'We have just received information of a positive character (we only had rumors before) that First Lieutenant George B. Coleman, jr., of New York city. who was captured about two months ago while out on a raid, was hanged within twenty-four hours afterwards, together with some twenty privates (colored) who were taken with him. I hope some action will be taken on the subject, and that soon. I know that the officers and soldiers of the *Corps d'Afrique* will take immediate and final action if they ever get into a fight. The men of the command will endeavor to protect themselves from such a fate, though the government should neglect to do it.'"

The government of the United States, in authorizing the employment of colored troops for the suppression of the rebellion, bound itself, and is undoubtedly under the most solemn obligation, to use its utmost power to throw over that class of troops the protection of the laws of war, and stands engaged before the world to make no compromise whatever which shall jeopard the claim of this class of troops, when captured, to be treated with that humanity which is due to all other troops in like circumstances, according to the laws of civilized warfare.

While we know of some individual instances in which the rebels have violated the laws of war, we do not know of a single instance in which they have respected those laws in their treatment of colored troops; and when the rebel agent of exchange offers, as he has done, to exchange *all* the prisoners of war in *his* hands, against all that we have in our hands, the surplus to remain on parole, it would manifest the most stupid blindness on our part to imagine for one moment that he has ever intended to include colored troops as subject to exchange. He might say, and with verbal truth, speaking individually, that *he* would deliver, under certain conditions, all prisoners in *his* hands, without intending to include this class of troops; because, by the action of the confederate authorities, not a single man, officer or soldier, belonging to the *Corps d'Afrique* has been or will be permitted to come into *his* hands. They have, on the contrary, when captured, been either murdered, cast into prison, or sold into slavery. *They are not recognized in the south as soldiers.*

Among a few instances serving to illustrate the spirit and purpose of the rebels in their treatment of colored troops, or colored persons in the employ of the government, it may be stated that two colored men employed in the navy, who were captured near Charleston, were heavily ironed and cast into prison in that city, beyond which fact we have no trace of them. We know of two free colored young men belonging to a Massachusetts regiment having been publicly sold into slavery in Texas, the price they brought under the auctioneer's hammer having been reported. We know of one case which directly illustrates the spirit of the rebel authorities on this subject, and which demonstrates the little faith to be placed by us upon rebel agreements for exchange. Only a few weeks since a proposition was made from our side that all chaplains held as prisoners of war should be mutually released, irrespective of numbers on either side. The rebel agent, Mr. Ould, professed to accept this proposition "cordially;" upon which we sent to the south all we had of that class of non-combatants in good faith, and received from the south about one-half the number belonging to us, supposing this was all they had in custody; but, as I now learn, upon authority which I am not at liberty to discredit, a chaplain belonging to a Massachusetts colored regiment, upon being captured, was heavily ironed and sent to a prison in Columbia, South Carolina, where he has been held, in violation of Mr. Ould's "cordial" acceptance of the proposition for a general release of this class of persons. I have every reason to believe that this particular chaplain, because he had belonged to a colored regiment, was deliberately withheld. Another chaplain, who had been his fellow prisoner, was separated from him and released, from whom we learned the facts in the case as just stated. Within the past few days, upon a formal application made by General Meredith, at my instance, to learn the history of two men who were reported to be, and are believed to be, officers of the federal army, said to be in the hands of the enemy, Mr. Ould furnished to General Meredith what purported to be the proceedings of a civil court in the State of Virginia, the testimony in the cases not being furnished, by which it appeared that the two men had been sentenced to a penitentiary for a term of years, on a charge of negro stealing; and the governor of Virginia, or of that part of it in rebellion, indorsed on the application of General Meredith a declaration that the two men in question should remain in the penitentiary while he remained governor of Virginia. In these instances there can hardly be a doubt but that these two men are undergoing humiliation and suffering because of their connexion with the federal government, on the pretence of being subjected to a penalty for negro stealing.

I suppose it unnecessary to proceed further into detail to show, to the satisfaction of every one who is willing to accept the truth, that the practice of the south has been and is entirely in keeping with the spirit of Mr. Davis's message to the rebel congress, or is carried beyond it, and that there has not been, up to the present time, the slightest indication of a purpose to relax, in any respect whatever, in the execution of their declared policy in the treatment of colored troops and their white officers who may fall into their hands; and I hold it to be certain that while they will keep from the light, as much as possible, their barbarous practices, they will pursue them inexorably, unless they can be made to feel that the national power is the strongest, and can show itself by the actual possession of a body of their troops held in the north as prisoners of war, who, by the laws of war, are liable to be used for retaliatory purposes.

It has been supposed, even in many parts of the north, that the proposition of Mr. Ould, of the 20th of October, for an exchange of prisoners is fair, and ought to be accepted; but it does not appear to be considered that Mr. Ould has not proposed to yield to us a certain number of prisoners of war and receive a like number in return, which would be a most happy consummation that would be at once accepted by this government. But his proposition is, that we shall deliver to him all of the prisoners in our possession, amounting now to about 40,000 men, and receive in return about 13,000 men, leaving about 27,000 men who might, for a few days, be considered on parole not to take arms unless duly exchanged. And then what would Mr. Ould do with those men?

Judging by what he has actually recently done, he would undoubtedly assume to discharge those men from all obligations under their parole, and put them into the field to fight against national troops, standing under an unstained national flag—the very troops who gallantly captured those men upon bloody battle-fields within the past few months.

To show the extreme probability of this, it is only necessary to refer to a few facts, beginning with the statement of Mr. Ould to General Meredith, officially communicated to me, that he, Mr. Ould, would "proceed to make declarations of exchanges whenever he conscientiously felt the right so to do, for the purpose of putting men into the field;" thus openly setting aside the cartel and the laws and usages of war in favor of *his* individual sense of right—which sense of right, in Mr. Ould, is so obtuse and wild as to justify him in making use of a "tabular statement" of alleged captures, principally in the western States, amounting to over 18,000 men, a considerable portion of whom were undoubtedly captured by guerilla parties, and were not soldiers, but, for the most part, peaceable citizens of the country, probably known as friends to the Union, who, for that reason, were seized and compelled to make an oath not to take arms against the southern confederacy; and this class of persons Mr. Ould expects us to accept in exchange for rebel troops, captured mostly at Vicksburg, who, having been paroled in the south, were "declared" exchanged by Mr. Ould, without any conference or understanding with our agent, in violation of the provisions of the cartel, and in violation of the usages of war.

It must be borne in mind that the cartel was virtually abrogated by the message of Mr. Davis; not, indeed, as to its binding character upon the south, for Mr. Davis had no power under the laws of war to abrogate the provisions of that instrument; but his declared purposes, in violation of the cartel, would have fully justified the United States government in declaring its provisions null and void; while, at the same time, the government has been at liberty to require its observance on the part of the south.

I do not mean to deny, in the reference just made to the tabular statement prepared by Mr. Ould, but that there were some men included in that statement who had been legitimately made prisoners of war, though not delivered according to the cartel; but, for the most part, the prisoners included in that tabular statement were not set down as having been captured upon any known battle-field, or as having been taken from or with any known federal commander, nor are they reported as having been delivered to any federal commander; but they are set down as having been captured at large in the State of Kentucky, nobody knows where; or in the State of Tennessee, or in other States of the west and south; whilst, in no less than four instances, they are reported as having been captured in "Kentucky and Tennessee"—the two States being thus coupled together—making it impossible, from the tabular statement itself, to determine where they were captured, or whether, indeed, any military captures whatever were made, except a few at Chickamauga, and, possibly, a few at one or two other places.

Mr. Ould is a mere agent under the cartel, and has no powers beyond those recognized in the cartel for the execution of its provisions, yet he has recently assumed to decide an important question by which he undertook to liberate from the obligations of their parole the whole of the prisoners, some six or seven thousand, captured by General Banks at Port Hudson, and paroled by General Banks under a special agreement with the rebel commander.

The world knows that those prisoners fell *unconditionally* into the hands of General Banks at the surrender of Port Hudson, and General Banks had the power to send them to the north if it had been his pleasure to do so; but he made an *agreement* with the rebel commander to release them on parole, and released them at Mobile in conformity with the agreement.

The cartel for the exchange of prisoners provided two places for their delivery, to wit: City Point, on James river, and Vicksburg, on the Mississippi; but it provided also that when either of these places should become unavailable by the exigencies of war for the delivery of prisoners, other points might be "agreed upon" by the commanders in the field. This was precisely what happened. Vicksburg having fallen into the hands of General Grant, had, by that exigency, become unavailable for the delivery of captured rebel soldiers, and when, subsequently, General Banks came into possession of several thousand prisoners by the unconditional surrender of Port Hudson, he made an *agreement* with the rebel General Gardner, their commander, to deliver his prisoners on parole at Mobile, and he did so.

Mr. Ould, without any proper authority whatever, assumed to write a letter on the 10th of October last, a copy of which he has not furnished us, but which has been published in a Richmond newspaper, in which he attempts to release all of those prisoners from obligations under their parole, because, as he undertakes to decide, they were not delivered at places named in the cartel, when the cartel itself provides for other places of delivery than those expressly named in the cartel, when rendered necessary by the exigencies of war. In the meantime, however, it cannot be doubted that the body of men in question have been put into the field to fight again the federal troops, by whom they were captured but a few months since; and this, too, without having been exchanged, and without having been properly released from the obligations of their parole.

Since writing the above, I have received an official report from General Meredith, one point in which will be here stated, to wit: that General Meredith, for the purpose of withdrawing our suffering prisoners from Richmond, distinctly proposed to Mr. Ould that he would send him 12,000 *or more* confederate prisoners, as many as he might hold of our men, and receive in return our prisoners held in the south; which proposition Mr. Ould refused to accept, but said that he would agree to a general exchange; the effect of which undoubtedly would be to cancel the excess of prisoners in our hands by a delivery of about 40,000 for about 13,000; to leave the rebel authorities the entire disposition of such colored troops and their white officers as they might capture; to expose Captains Sawyer and Flynn to their fate under orders in Richmond, which have never *been countermanded;* to turn loose again certain notorious guerilla leaders to renew their ravages in Kentucky and Missouri, (neither of which States have ever united with the so-called southern confederacy;) to put into the field a fresh army of rebels to be recaptured; and, in short, we should deliberately neutralize or throw away a chief part of the power of the government at this time, through which there may be some hope, by measures yet to be decided upon, of controlling the action of the authorities in Richmond in their treatment of prisoners of war, and compelling them to respect the laws of war, if they are deaf to those of humanity.

We consider that, at this time, the rebel authorities owe us upon the exchange list more than all of the prisoners of war they now hold, as equivalent for the prisoners paroled by Generals Grant and Banks; and even already the question has come up from General Grant's glorious battle-field at Chattanooga, as to what shall be done with a body of the enemy, who, having been paroled as prisoners of war at Vicksburg, have been recaptured in arms at Chattanooga, without having been properly exchanged.

I ought to state here that the government of the United States would not *haggle* about a few men, more or less, if it were hundreds or even thousands, if the question was the relief, and that alone, of our suffering prisoners in Richmond; but whoever considers the above statement of facts cannot fail to see that other questions and points are involved, which it is not safe, if it were honorable, for this government to overlook.

It should be stated, also, that an offer was made to the rebel agent some days ago to receive all of the prisoners from Richmond under a solemn pledge that they should not be allowed to take arms unless duly exchanged with the consent of the rebel authorities, without reference to existing difficulties on the subject of exchange, and that this government would pledge itself to both feed and clothe all rebel prisoners in our hands.

This proposition also was rejected, and the Secretary of War was thus greatly restricted in his means of affording immediate relief to our prisoners in Richmond; but they have not been overlooked. God forbid. The Secretary of War has ordered both clothing and provisions to be sent through the rebel lines to sustain them, although those supplies, from the necessity of the case, have been intrusted to the honor and humanity of the enemy, whose agents may or may not permit the supplies to be delivered.

Meantime it is well for the country to understand that this rebellion is to be put down by organized armies in the field, acting upon and destroying organized opposition to the government, and no real progress can be made except in this direction, to which end the energies of every loyal man in the country should be devoted. The progress already made in suppressing the rebellion may afford the fullest assurance of final success; and this end will appear the more certain when it is considered that the *Corps d'Afrique*, in the service of the government, already numbers fifty thousand brave, athletic men, who are fighting in support of this government, under the guidance of a body of most earnest and intelligent officers, who count their lives as subordinate to the cause they are engaged in.

I undertake to assure my countrymen that the hopes of the most sanguine have been more than realized in the facility with which the government has brought within its power of organization the colored population of the country; and the system contains within itself such powers of expansion, that slavery in the south is inevitably destined to give way before it, when this element is seen to work, as it will, in harmony with the organized loyal power of the nation directed to the preservation of republican institutions, and the union of the States under one general government, capable of giving protection to the whole, from both domestic disturbance and foreign invasion.

Very respectfully, your obedient servant,

E. A. HITCHCOCK.

Postscript to the letter of General Hitchcock to the New York Times, published December 2, 1863.

To the Editor of the New York Times:

In further explanation of the subject of exchanges of prisoners of war, I make the following extract from a letter addressed to Mr. Ould by Colonel William Ludlow, (as agent of exchange,) dated New York, July 22, 1863, by which it will be seen that Colonel Ludlow expressly declined to acquiesce in a proposition for the release of the officers captured and paroled by General Grant at Vicksburg:

"Your communication of the 17th instant (July, 1863) has been forwarded to me here, (Colonel Ludlow being temporarily absent from Fort Monroe at the time.) There is no authority in the cartel for your proposed declaration of exchange of your officers captured at Vicksburg, in the manner you indicate."

Yet Mr. Ould subsequently, after Colonel Ludlow had been relieved by General Meredith, made the declaration not only for the exchange of the officers, including one lieutenant general, but of the non-commissioned officers and privates, embracing nearly all of General Grant's captures. Colonel Ludlow proceeds:

"The cartel provides for exchanges of equal rank until such are exhausted, and then for equivalents. In consequence of the very much larger number of your officers and men we hold on parole and in confinement, you can give no equivalents for the general officers you desire to have exchanged. You cannot for a moment assume that you can select a general officer and declare his equivalents in those of inferior rank, when we hold the paroles of your officers of the same rank as the latter. But even supposing this arrangement was permitted by the cartel, I do not see how you could avail yourself of it at this time.

"You will recollect that since the proclamation of Hon. Jefferson Davis, of December last, and more especially since the passage of the act of the confederate congress in reference to our captured officers, *both of which were in violation of the cartel, and have caused in the one case a temporary, and in the other a continued suspension of exchanges of officers*, that all such exchanges have been subjects of special agreement between us.

"To avoid the complications and annoyances of these special agreements, *I have again and again urged you to return to the cartel*, but up to the present moment in vain. On the contrary, you retain in close confinement large numbers of our officers, for whom I have made a demand and tendered equivalents. Until you consent to return to the terms prescribed by the cartel for exchanges of officers, I shall not consent to any exchanges except on special agreements.

"I repeat to you that I decline to unite in your proposed declaration of exchange of officers captured at Vicksburg, and if recaptured they will be dealt with as violators of their parole. Ought you not, in justice to those officers, to notify them of the exact conditions of their cases, and thus enable them to avoid being placed in false positions?

"*If you are authorized to deliver our officers now held in close confinement, and to a return to the cartel in exchanges of all officers and men,* all the complicated questions which have arisen within the last few months can be promptly disposed of."

It has been supposed by some, and the idea seems to have been assiduously set on foot, that, because the subject of the exchange of colored troops, or of officers confined in southern prisons, captured subsequently to the proclamation of the President, makes no prominent part of the recent correspondence between General Meredith and Mr. Ould, therefore the stand taken by the south on this subject has had nothing to do with the difficulties on the subject of exchanges; but the simple truth is, that the recent correspondence grew out of, and had reference exclusively to, other than specific points of controversy, and there was no particular occasion to discuss in that correspondence the proclamation of Mr. Davis and the proceedings of the rebel congress on that subject.

It will be seen, from Colonel Ludlow's letter, that the question was fully stated in all its bearings by Colonel Ludlow, and that Mr. Ould was invited, *if he had authority*, to return to the cartel; that is, he was invited to abandon the ground taken by Mr. Davis and the rebel congress. But this he has never done; and to show that the south has definitively taken its stand on this subject, and does not mean to recede from it, the Richmond *Enquirer* of the 2d instant need only be consulted.

In the issue of that date the *Enquirer*, on the very question of the treatment of colored troops and their officers, recites a portion of the language of the rebel act of congress in these words:

"The law of the confederate congress, approved May 1, 1863, recites: 'That, in the judgment of congress, the proclamations of the President of the United States, dated, respectively, September 22, 1862, and January 1, 1863, and other measures of the government of the United States and of its authorities, commanders, and forces, designed or tending to emancipate slaves in the Confederate States, or to abduct such slaves, or to incite them to insurrection, or to employ negroes in war against the Confederate States, or to overthrow the institution of African slavery, and bring on a servile war in these States, would, if successful, produce atrocious consequences, and they are inconsistent with the spirit of those usages which, in modern warfare, prevail among civilized nations. They may, therefore, be properly and lawfully repressed by retaliation.'"

Here we have the law as it now stands unrepealed upon the statute books of the so-called Confederate States of America; and that this expresses the public feeling in the south, we need only read the editorial comments in the *Enquirer*, where we find this language:

"This law authorizes the President of the Confederate States to retaliate for every violation of the laws or usages of war on the part of the enemy, and declares the commanding, organizing, or aiding negroes in arms against the Confederate States to be inciting servile insurrection, and those so offending, when captured, are punished with death, or in the discretion of the court. The law further punishes with death the inciting a servile insurrection or rebellion; and that all negroes and mulattoes taken in arms against the Confederate States shall, when captured, be delivered to the authorities of the State or States in which captured, to be dealt with according to the laws of such State.

The language of this law has been construed by the enemy to apply to free negroes of the United States, and we must admit that such construction is not forced, but does come within the terms of the law. But as it is clearly not within the province of one nation to undertake to prescribe the soldiers which another shall use in its armies, we hope this law will be confined, by additional legislation, to such employment by the enemy of slaves or free negroes of the several States of the confederacy."

Here we see that the law, *as it stands*, applies even to free colored men of the north who may engage in the service of the United States; and the editor takes occasion to suggest a modification of the law so far as they are concerned; but there is not a word against the law in other respects. As the law is applicable to both the slaves and the free colored people of the south who may be found in the army of the government, they are to be dealt with according to the provisions of the law, which is all the more distinctly declared by the proposed exception in favor of the free colored people of the north.

But the editor did not intend to leave the smallest doubt as to the purpose of the south on this question; for, after stating an exception in favor of the free colored men of the north, which, however, the law, as it stands, does not recognize, he proceeds to remark as follows:

"But the employment of our slaves and free negroes rests upon entirely different premises, and retaliation for such employment comes directly under the laws of war. Upon such retaliation we can stand before the nations of the world, just as we can upon the punishment of any deserter from our ranks, or of treason upon the part of any of our people.

"'The right of *postliminium*,' says Vattel, 'is that in virtue of which persons and things taken by the enemy are restored to former state when coming again under the power of the nation to which they belonged.'

"And the American jurist, Wheaton, says:

"'The *jus postliminii* was a fiction of the Roman law, by which persons or things taken from the enemy were held to be restored to their former state when coming under the power of the nation to which they formerly belonged. It was applied to free persons or slaves returning *postliminii*.' Here, then, is the law of nations under which the right to return a slave to his master is plainly and fully laid down, and upon this, and also upon the right to punish him for being found in the ranks of the enemy, the confederate authorities will stand, and from which they will not depart."

Here, then, we have the rebel law and the rebel comment, and we are told in the most affirmative language that upon this *the confederate authorities will stand, and from it they will not depart.*

In view of this *exposé* no one can doubt the purpose of the south on the subject of colored troops who may be captured in the service of the government; and it is inconceivable how any one can favor the proposition of a general exchange of prisoners while the law in the south is what their own papers represent and approve, and while the practice unhappily, according to a good deal of evidence, goes beyond the law itself in barbarity.

It may just be remarked that the Richmond editor treats the question as one between two nations already acknowledged as independent; but the recognition of certain belligerent rights, principally affecting prisoners of war, does not relieve rebels from obligations under the government and laws of the United States. The *jus postliminii*, which even Wheaton calls a fiction of the Roman law, is wholly inapplicable here; and the *right* of the south to *punish* any one is without foundation, and must remain so until all rights over the south under the general government shall cease; and this has now become a question of power as between the federal government and the rebellious movement in the south, to reduce which involves the very life of the Union and the government of the United States of America.

Very respectfully, your obedient servant,

E. A. HITCHCOCK.

NOTE.—Since writing the letter published in the New York Times of the 2d instant, I have a further proof of the disposition of the rebel agent to declare prisoners exchanged without regard to the cartel, showing most clearly that the excess of prisoners, now in confinement in the north, cannot be sent south on *parole* without imminent risk of their being declared exchanged, and put into the ranks without any proper authority.

To understand the last fact that has come to light in this history, it is necessary to restate that, after the surrender of Vicksburg to General Grant, the rebel agent of exchange designed to release from the obligations of their parole the Vicksburg prisoners; but (and this he admitted subsequently to his declaration of exchange) he did not know, in detail, what constituted the force captured and paroled by General Grant. This is the reason why, in making his declaration, he refers, not to definite numbers, but to corps, divisions, brigades, &c., enumerating those best known to him as being a portion of those troops. He afterwards made a further declaration including others; but there remained yet some troops under special designations, such as fragments of certain Mississippi regiments of infantry; the Memphis Appeal battery; light artillery; the Vaiden battalion artillery; and other fragments, amounting in all to 1,474 privates, with sundry officers, the knowledge of whom has probably but recently reached him; and as he had determined to *free* all of the paroled troops in the south within his reach, he wrote to General Meredith, on the 3d instant, announcing his purpose to declare *exchanged* on the 6th of the month all of those officers and men; which, of course, he has done, thus carrying out literally his avowed purpose that he would proceed to declare exchanges "whenever he conscientiously felt the right to do so, for the purpose of putting men into the field."

At the time he made his first declaration of exchange, (of the Vicksburg prisoners,) he stated, in a letter to General Meredith, that he had "valid paroles" for more than all of the prisoners he had declared exchanged. When called upon for those paroles, he furnished the tabular statement, a copy of which is hereto annexed, (marked D,) amounting to over 18,000 men, as already referred to. In forwarding that tabular statement he informed General Meredith that he had *other* valid paroles, which he was collecting evidence of, and which, in due time, he would claim credit for—thus holding out an indefinite claim for paroles not recognized by the laws of war, and of men not delivered according to the cartel; and now, in forwarding the last list, he uses the same indefinite language, that he has in his possession valid paroles "sufficient to counterbalance this and the other exchanges" he has declared.

By this unauthorized procedure, the rebel agent would establish a practice by which, with the aid of rebel raiders ranging over unprotected portions of Kentucky, Tennessee, Mississippi, &c., &c., he may have it in his power at any time to discharge from their *parole* any number of men we may permit to go south on parole. If we now call upon him to justify his last declaration of exchange, he would without doubt furnish another *tabular statement*, embracing miscellaneous captures by guerilla parties *depredating upon* and *capturing* peaceable people, whose only offence is fidelity to the government established by their fathers.

I have stated in my report that the rebel agent had delivered at City Point, according to the cartel, about fifteen thousand men, for whom he had receipts; and that, having done so, he was entitled to declare a like number of his own men discharged from their parole, he furnishing a "list" of them. Instead of conforming thus to the cartel, he has informally, without any proper conference with General Meredith and against the formal protest of General Meredith's predecessor, Colonel Ludlow, actually discharged from their parole, and put the officers and men into the rebel army, about thirty-seven thousand men; and this, too, without giving the smallestin timation, though invited to do so, of a purpose to abandon the grounds taken by the rebel authorities with regard to captured officers of the federal army, or to captured officers and men of the colored troops, *the laws and proclamations with respect to these officers and men remaining unrepealed and ready to be enforced the moment the rebels feel safe in bringing them to bear.*

E. A. HITCHCOCK.

D.

Tabular statement of the number of valid federal paroles.

[This paper was sent by Mr. Ould to General Meredith, with a letter dated October 27, 1863.]

Where captured.	By whom.	When.	No. of prisoners.
Lavergne, Tennessee	General Wheeler	December 11 and 31, 1862	128
Lexington, Tennessee	General Forest	December 17, 1862	140
Benton Station, Tennessee	do	December 18 and 22, 1862	45
Near Spring Creek, Tennessee	do	December 19, 1862	110
Trenton, Tennessee	do	December 20, 1862	684
Near Rutherford Station, Tenn	do	December 21, 1862	144
Union City	do	December 23, 1862	86
Parker's Cross Roads & Dresden	do	Dec. 25, 1862, and Jan. 9, 1863	268
Kentucky and Tennessee	General Morgan	Dec. 7, 1862, and Jan. 27, 1863	190
Tennessee	General Wheeler	Dec. 30, 1862, and Jan. 5, 1863	381
Liberty, Tennessee	General Morgan	Dec. 26, 1862, and Feb. 13, 1863	78
Kentucky and Tennessee	do	Dec. 20, 1862, and Jan. 10, 1863	2,025
Near Murfreesboro', Tennessee	General Bragg	December 31, 1862	559
Galveston and Houston, Texas	Receipted for at Baton Rouge	January 1 and 22, 1863	359
Tennessee	General Wheeler	January 10 and 14, 1863	318
Kentucky and Tennessee	Generals Wheeler & Morgan	Jan. 10 and Feb. 14, 1863	111
Steam-ram Queen of the West	Receipted for at Baton Rouge	February 14, 1863	21
Near Memphis, Tennessee	Jackson's cavalry	do	10
West Liberty and McMinnville	General Morgan	Feb. 14 and March 7, 1863	51
Spring Hill, Tennessee	Bragg's command	March 7, 1863	103
Liberty, Tennessee	do	do	134
Near Rappahannock, Virginia	Major Mosby	do	39
Bourbon county, Kentucky	General Marshall	April 11, 1863	3
Western Virginia	General Jones	do	375
Chancellorsville, Virginia	General Lee	May 1 and 4, 1863	1,709
Western Virginia	General Imboden	May and June, 1863	18
Banks's Ford, Virginia	General Lee	May 4, 1863	128
Fredericksburg, Virginia	do	do	126
Vicksburg and vicinity	Pemberton's command	do	492
Near Monticello, Tennessee	General Pegram	May 25, 1863	19
Hinds county, Mississippi	Captain Reiley, 8th Kentucky	May 26 and June 6, 1863	742
Eastern Virginia	Major Mosby	June 11	16
Rome, Georgia	Bragg's command	April 30 and May 2, 1863	66
Mississippi	do	May 12 and 22, 1863	17
Kentucky and Tennessee	do	May 1 and 20, 1863	85
Holly Springs, Mississippi	General Van Dorn	December, 1862	1,694
Baton Rouge, Louisiana		February 24, 1863	302
Paroled at Salisbury, N. C		May 24, 1863	1,394
Perrysville, Va. & Gettysburg, Pa	General Lee	July 2, 1863	2,689
Dover, Pennsylvania	General Stewart	do	229
Rockville, Maryland	do	do	157
Paroled at Williamsport	do	July 13, 1863	75
Morris island, South Carolina	General Beauregard	July, 1863	142
Near Chattanooga, Tennessee	General Bragg	September, 1863	2,372
Miscellaneous paroles			33
Total			18,867

OFFICE OF COMMISSARY GENERAL OF PRISONERS,
Washington, D. C., November 30, 1863.

GENERAL: Your note of this date, requesting a statement of the number of prisoners exchanged and in custody on both sides, is just received, and I have the honor to enclose herewith an abstract from the records in this office, showing the number of federal prisoners who have been in the hands of the enemy, and how many have been released, exchanged, died, or are still held by them up to the 26th instant. A similar abstract of rebel prisoners, who have been or are still in our hands, is also enclosed.

I have no record of prisoners in the hands of the enemy except the number of officers stated.

I am, general, very respectfully, your obedient servant,

W. HOFFMAN,
Colonel 3d Infantry, Commissary General of Prisoners.

Major General E. A. HITCHCOCK,
Commissioner for Exchange of Prisoners, Washington, D. C.

Consolidated report of prisoners of war (federal) exchanged, paroled, and on hand at Richmond.

Rank.	Total number.	Value.	TOTAL VALUE.	
			Citizens.	Privates.
Brigadier generals	9	20	....	180
Chaplains	9	....	....	9
Surgeons	156	....	....	156
Colonels	77	15	....	1, 155
Lieutenant Colonels	97	10	....	970
Majors	106	8	....	848
Captains	1, 197	6	....	7, 182
Lieutenants	1, 916	4	....	7 664
Non-commissioned officers	13, 010	2	....	26, 020
Privates and citizens	76, 816	....	806	76, 010
Total	....	....	806	120, 194

	Brig. generals.	Chaplains.	Surgeons.	Colonels.	Lieut. colonels.	Majors.	Captains.	Lieutenants.	Citizens.	Non-commiss'd officers.	Privates.	Total aggreg'e.	TOTAL VALUE.	
													Citizens.	Privat's.
Exchanged	7	7	72	63	72	77	935	1,303	712	12, 232	73, 080	87, 848	712	110, 866
Died	....	....	....	....	....	....	4	2	6	9	186	198	9	218
On parole	1	2	1	....	....	1	14	42	88	769	2, 744	3, 574	88	4, 565
On hand at Richmond, Va	1	....	83	14	25	28	247	569	....	......	......	967	....	4, 545
Total	9	9	156	77	97	106	1,197	1,916	806	13, 010	76, 010	95, 587	806	120, 194

W. HOFFMAN,
Col. 3d Infantry, Com. General of Prisoners.

OFFICE COMMISSARY GENERAL OF PRISONERS,
Washington, D. C., November 26, 1863.

Official.

W. T. HARTZ, *Captain and A. A. G.*

Consolidated report of prisoners of war (confederate) exchanged, paroled, released, and on hand.

RECAPITULATION.

Rank.	Total number.	Value of each.	Total value.
Lieutenant generals	1	60	60
Major generals	5	40	200
Brigadier generals	25	20	500
Chaplains	36	....	36
Surgeons	273	....	273
Colonels	186	15	2,790
Lieutenant Colonels	146	10	1,460
Majors	244	8	1,952
Captains	2,497	6	14,982
Lieutenants	5,811	4	23,244
Non-commissioned officers	16,563	2	33,126
Privates	121,156	1	121,156
Citizens	5,811	....	5,811
Total	152,764	....	205,600

	Lt. general.	Maj. generals.	Brig. generals.	Chaplains.	Surgeons.	Colonels.	Lt. colonels.	Majors.	Captains.	Lieutenants.	Citizens.	Non-commiss'd officers.	Privates.	Total aggreg'te of troops.	TOTAL VALUE.	
															Citizens.	Privat's.
Exchanged	1	4	16	28	93	100	79	117	1,414	3,414	605	9,875	76,281	21,422	605	121,937
Died, released, escaped, &c.	..	..	1	..	63	6	....	7	70	140	3,673	830	10,037	11,154	3,673	12,843
On parole	..	..	1	..	....	19	16	46	269	572	116	1,919	12,303	15,145	116	20,876
On hand Nov. 1, 1863	..	1	7	8	117	61	51	74	744	1,685	1,417	3,939	22,535	29,222	1,417	43,814
Total	1	5	25	36	273	186	146	244	2,497	5,811	5,811	16,563	121,156	76,943	5,811	199,470

W. HOFFMAN,
Col. 3d Infantry, Com. General of Prisoners.

OFFICE COMMISSARY GENERAL OF PRISONERS,
Washington, D. C., November 27, 1863.

Official.

W. T. HARTZ, *Captain and A. A. G.*

OFFICE OF CAVALRY BUREAU,
Washington, D. C., October 15, 1863.

SIR: I have the honor to submit a report of the operations of the Cavalry bureau from its organization up to this date.

On the 31st day of July, 1863, I received a copy of General Orders No. 236, from the War Department, establishing a bureau to be designated as the Cavalry bureau, and on the 1st of August I was furnished with a copy of General Orders No. 237, from the War Department, designating me as its chief.

A few days afterwards the Secretary of War, in a consultation he had with the general-in-chief, the Quartermaster General and myself, decided several questions which had arisen, and, amongst them, it was decided that the Quartermaster General should continue to furnish the army with horses until the chief of cavalry should notify him that the Calvalry bureau was able and ready to take this duty upon itself. Another was the establishment of a cavalry depot, capable of accommodating from ten to twelve thousand horses, sick and well, at some point on the Eastern Branch of the Potomac river, and between the mouth of the Eastern Branch and Fort Washington. I proceeded at once to make a very thorough examination of the country between these two points, and selected a place called Giesboro' Point, on the south bank of the Eastern Branch, and at its confluence with the Potomac river. This selection was approved by the general-in-chief, the Quartermaster General, and by the War Department, and immediate steps were taken to commence its construction.

The location is considered an admirable one in every respect, being easy of access by land and water transportation, and one to which horses and supplies of all kinds can be brought, and from which they can be sent in any direction with the greatest facility.

The channel of the Potomac at this point runs nearer the shore than at any other place for many miles below, thus requiring less wharfage than at any other point. Being within the line of the defences of Washington, renders it free from a liability to be surprised or attacked by the enemy, and requires no guard for its protection, other than that required at all times for the defence of the other depots at and in the vicinity of the capital of the country, and is, besides, near enough to Washington to be under the immediate supervision and control of the head of the Cavalry bureau.

Its topographical features admirably adapt it to the purposes to which it has been applied, being ground gently sloping to the west and southwest, in extent ample for all purposes; soil, a mixture of sand and gravel, with an abundance of good water, either from the Potomac river, which runs on the north and west sides, or from the large stream of very pure spring water running on the east side, called Open run.

A building having been secured on H street, No. 374, at a rent of seventy dollars per month, in which to locate the office of the Cavalry bureau, estimates were made for funds to start with; advertisements were inserted in the authorized newspapers for men and material, and the work at once begun, and, all things considered, such as the failure of contractors, the difficulty of procuring laborers, &c., has progressed up to this time with unusual rapidity.

In connexion with this depot is a dismounted camp, where all new regiments of cavalry can be sent to be mounted, armed, accoutred and equipped, and to which men of the old regiments are sent to be refitted and again sent to the field.

Measures will be taken, as soon as store room can be constructed at the cavalry depot, to get on hand an amount of forage sufficient to guard against the contingency of the Potomac river being closed by ice during the coming winter.

My assistants in the bureau are Lieut. Col. C. G. Sawtelle, chief quartermaster; Lieut. A. I. Alexander, in charge of records, returns, reports, details, &c.; and Capt. Wm. R. Price, in charge of issues of ordnance and ordnance stores—all officers of experience in the field, as well as thoroughly acquainted with the duties with which they are intrusted.

There are stables and barracks at St. Louis, Mo., capable of holding from ten to twelve thousand men and horses, which are not now required for other purposes, and which are to be turned over to the Cavalry bureau for a cavalry depot in the west. It is thought that these two general depots, with temporary structures for the accommodation of four or five thousand horses, at either Louisville, Indianapolis, or Columbus, Ohio, will satisfy the wants and requirements of the cavalry arm of the service. I should recommend the erection of the last.

I should recommend that the contract system be dispensed with as far as consistent with the public interest, and that most of the purchases be made in open market and first hands.

In order that owners of horses may derive the most benefit from this system of purchase in open market, and, at the same time, the government be enabled to get at all the horses in the country, without the necessity of increasing the number of agents too largely, the same agent can be assigned to different points in his district or region, spending a limited time at each point, due notification being given to all concerned of such an arrangement. These points should be located on main avenues of land or water transportation, and the horses shipped or sent to depots as fast as they are purchased.

Horses are now being purchased on contract at Washington, Chicago, and St. Louis, Missouri. At other points, viz: Augusta, Maine; Boston, Massachusetts; New York city, Albany, Rochester and Buffalo, New York; Pittsburg, Pennsylvania; Columbus, Ohio; Detroit, Michigan; Madison, Wisconsin; and Clarksburg, West Virginia, they are bought in open market, due public notice having been given in each case to all concerned.

The price of horses varies from $120 to $145 per head, being cheaper in the western than in the eastern States.

As an illustration of the benefit which will accrue to the government in an economical point of view by the establishment of cavalry depots, I beg leave to state the following facts: After the battle of Gettysburg there were collected at and in the vicinity of Fredericksburg about 5,500 horses; out of this number less than 2,000 are remaining alive, 1,000 of which have been returned to duty in the field. Of the 3,500 horses, the portion of this 5,500, which have since the 10th of July died, strayed or been stolen, I venture to say enough might have been saved to the government to have more than paid for the erection of stables at the cavalry depot at Giesboro' Point, and which will accommodate ten thousand horses, sick and well.

The number of unserviceable cavalry horses on hand, at and in the vicinity of Washington, is upwards of sixteen thousand. The larger proportion of which can, with proper care and treatment, be again made fit for service in the field.

One great want felt by the cavalry service is the deficiency of veterinary talent in the country, and the impossibility of obtaining what little there is for the compensation now allowed by the government.

The condition of the cavalry force throughout the country is reported upon, as a general thing, favorably.

* * * * * * * * *

The total amount of money received by the Cavalry bureau up to October 15 is	$1,400,000 00
Of which there has been expended, as per Exhibit C	949,364 57
The total number of horses offered on contracts up to October 15	145,195
Total number accepted on contracts	30,950
Number received from contractors and bought in open market	6,562

Respectfully submitted.

GEORGE STONEMAN,
Major General Volunteers, Chief of Cavalry.

HON. SECRETARY OF WAR.

Names of officers on duty in Cavalry bureau.

Names.	Rank.	Station.	Remarks.
H. A. Dupuy	Captain	Washington, D. C	Assistant quartermaster.
Fielding Lowry	Captain	Pittsburg, Pa	Do.
C. E. Fuller	Captain	Buffalo, N. Y	Do.
G. W. Lee	Captain	Detroit, Mich	Do.
James A. Ekin	Captain	Indianapolis, Ind	Do.
R. Brinkerhoff	Captain	Augusta, Me	Do.
J. A. Potter	Captain	Chicago, Ill	Do.
Ingraham Coryell	Captain	St. Louis, Mo	Do.
T. J. Bar	Captain	New York	Do.
Edward Ball	Lieut	Giesboro' Point, D. C	Do.
W. H. Turner	Major	Giesboro' Point, D. C	Inspector of horses.
B. Ellis	Lieut	Giesboro' Point, D. C	Do.
William Gamble	Colonel	Chicago, Ill	Do.
M. H. Wing	1st Lieut	Chicago, Ill	Do.
Samuel McKee	Captain	Syracuse, N. Y	Do.
J. R. Drenner	Captain	Syracuse, N. Y	Do.
J. B. Smith	1st Lieut	Syracuse, N. Y	Do.
John Green	Captain	Indianapolis, Ind	Do.
B. Q. A. Gresham	Captain	Indianapolis, Ind	Do.
E. M. Baker	Captain	Pittsburg, Pa	Do.
A. H. Bixby	Captain	Pittsburg, Pa	Do.

OFFICE OF THE SIGNAL OFFICER,
October 30, 1863.

SIR: The average number of officers on duty in the signal corps of the army since my last annual report has been one hundred and ninety-eight, (198.) These have served with different armies and different military departments, with nearly the following distribution:

In the army of the Potomac	36
In the department of the Cumberland	42
In the department of the Gulf	15
In the department of North Carolina and Virginia	18
In the department of the south	21
In the department of the Susquehanna	3
In the department of Tennessee	41
In the camp of instruction, Georgetown, D. C	22
Total	198

The duties of the corps have been discharged, during the past year, under more favorable conditions than when previously reported.

The armies have been older. The generals, more experienced, and with a better comprehension of the modes in which the signal corps could be best used, have learned to both employ the detachments with their commands and to appreciate their sevices. There have been fewer unauthorized interferences with signal duties, and parties have been able to take the field with more complete appliances for the rendering of their services, and with a skill increased by practice. The portable telegraphic lines—always necessary for the best success of the corps—have been furnished at last by a wise liberality of the War Department, and the equipments for aerial telegraphy and reconnoissance have been improved by such additions as the longer service of the corps seemed to indicate. The slowness with which the organization of the corps has, of necessity, been made has prevented so great a utility as may be hoped from a perfect organization; and it has sometimes been the task of its officers, by services rendered, to bring generals to a conviction of its utility, by experience, of the service rendered, only to find each changed as he seemed at last to thoroughly understand and rely upon them. They appear, however, (struggling with all these disadvantages, and fighting while they have been organizing, through all the great campaigns of the last year,) to have maintained an efficiency equalling that of other branches of the service.

It has been a cause of congratulation to officers of the corps that their services seemed to be approved and sought for in proportion as generals commanding them have proved enterprising and successful.

The corps has taken part, during the past year, in every campaign of note east of or upon the Mississippi, and also in some west of that river, in Arkansas and Louisiana.

Detachments were present and serving at the battle of Ralston Mills, North Carolina; battle of Kingston, North Carolina; battle of White Hall, North Carolina; battle of Goldsboro', North Carolina; battle of Murfreesboro', Tennessee; battle of Georgia Landing, Louisiana; expedition against gunboat Cotton, Louisiana; engagement before Fredericksburg, Virginia, (from December 11 to December 16, 1862;) expedition against Swansboro', North Carolina; action at Newbern, North Carolina, (March 14, 1863;) siege of Washington, North Carolina; siege of Suffolk, Virginia; expedition to White House, Virginia, (from April 11 to May 2, 1863;) expedition from Newbern, North Carolina, (July, 1863;) with combined operations of land and naval forces at Baton Rouge and Port Hudson, Mississippi, (March, 1863;) siege of Port Hudson, from its commencement until the surrender of the port, (July 8, 1863;) at the attack of the works of the enemy near Charleston, South Carolina, (April, 1863;) during operations at the siege of Charleston, South Carolina; expedition to James river, Virginia, by cavalry forces of army of Potomac, (June 28, 1863;) battle of Chancellorsville, Virginia; Pennsylvania campaign; battle of Chickamauga, Tennessee; siege and capture of Vicksburg, Mississippi; battle of Gettysburg, Pennsylvania.

The exposure of life in this service is, so far as can be judged from returns at this office, about the same as that on other staff duty. The risk of capture, resulting from constant service on reconnoissance and at outposts, is, perhaps, greater than that in any other branch of the service. The casualties of the past year have been as follows:

Commissioned officers.—Wounded in action, 4; missing in action, 1; taken prisoners, 9; deaths by disease, 2. Total, 16.

Enlisted men.—Wounded in action, 6; missing in action, 1; taken prisoners, 22; deaths by disease, 9; deaths from wounds received in action, 1. Total, 39.

THE SERVICES OF THE CORPS.

Of the importance of the services of the corps and of the benefits resulting to the general service from their action there are, at this office, only two means of judging—the demand for the services of the detachments of the corps, and the official reports of services rendered. The demands for detachments have been proportioned as campaigns were active. In most of the great campaigns of the past year, however, the requisition for signal officers has been greater than it was possible to supply. In some instances the number required by generals in the field has been twice that which could be furnished; whilst representations made to generals commanding other military departments, with a view to withdrawing from such departments a portion of the corps therein serving for duty elsewhere, have been met by the reply that the interests of the service required, in those departments, the continued presence of all signal officers there on duty.

I have the honor to submit the official reports and other papers bearing upon the operations of the corps, together with maps illustrating the positions, and such message reports as indicate the character of the duty, also a number of commendatory letters from military and naval officers. These reports possess an additional value, as exhibiting the acquirements, as a class, of the officers who have been employed.

In considering the services of the corps it ought to be held in mind that, wherever its officers have been actually on duty they have rendered a service otherwise impossible; they have forced the enemy to introduce new elements into his calculations of military movements, and they have aided the commanders of our armies with an assistance at first novel to most of them. A few years ago the modes of communication—either those of aerial or electric telegraphy—constantly employed by these officers in the campaigns of the past year, would have been held mysterious, and the results almost miraculous. If they have made these modes common, and so constantly offered them for the use of generals, that the results have ceased to longer excite surprise or comment, and if the duty is now held as something of course practicable with every army, it has become so through the energy and zeal of those upon it.

Aside from duties on land, to them eminently belongs the credit of that service, whatever may be its value, which has assured, throughout this war, the intelligent and certain co-operation of our land and naval forces wherever they have been present.

To contemplate the results of this labor, and the absolute value of the services of signal officers in this war, it is necessary to consider, in brief, the facts as set forth in the accompanying reports.

In the first expedition to Port Royal the rapid telegraphing among the vessels of the great armada which the service of these officers gave through its perilous voyage, were of the best results to the expedition. No modes approaching to its speed were previously known to general military use.

At the landing at Port Royal ferry, where the United States troops first touched the mainland of South Carolina, their advance could be covered by the heavy batteries of the gunboats, as it was, and necessarily, only by the service of the signal officers who accompanied them.

In all the campaigns of Generals Banks and Pope, in the valley of the Shenandoah and on the Rappahannock, the detachment of the corps—its officers, on one occasion at least, serving within the enemy's lines, and always active—won the regard of those generals, and sometimes determined great movements. The flank movement of Lee's grand army, for the first invasion of Maryland, is reported to have been first recognized from a signal station.

At the siege of Yorktown, officers of the corps kept the communication with the navy lying some miles distant in the bay, while their stations of observation reached the James river.

At the battle at West Point, Virginia, without their aid the naval broadsides could not have been turned, as they were, against the enemy, but must have largely wasted at random.

Before Richmond, at Williamsburg, and at White House they were constantly on duty, and their services was frequently important.

On the battle-field at Malvern Hill the aid of signal officers subjected to control, from land, the fire and movements of the fleet through both days' battle. It is difficult to compute the value, then, of this service, whilst, thenceforth, throughout all the service of the land and naval forces on the Peninsula, their aid was in requisition.

At South mountain and Antietam signal officers won, by their conduct and the value of their services, the commendation of the general there commanding.

In the first attack on Fredericksburg, and in the long campaign before that city, they had, for their efficiency, the praise of General Burnside.

In the movements at Chancellorsville, crippled as the corps was by the failure (through no fault of its members) of some of the apparatus, they rendered such service, as that may be, which kept up the communication with General Sedgwick's 6th army corps—at that time utterly cut off from the main body of the army and from headquarters—over the heads of the rebel forces, and when, the retreat being ordered and the army falling back in the night upon the river, the pontoons on the right wing of the army were swept away, a message went, by their aid, across the swollen river to hold the army in its lines instead of crowding it, with danger of a panic, on the banks of a torrent it could not cross.

In the movements to Gettysburg the field telegraphic lines and the signal stations of the corps, working together, connected army corps scattered miles apart in front of Washington, and orders went from corps to corps when the enemy's cavalry prevented the passage of couriers, and even contested with heavy escorts. If all the services of the corps, in this campaign to Pennsylvania, thus expedited the movements of our army by one day to reach the field of Gettysburg, that service alone was worthy of consideration.

When the rebel army, in this campaign, recrossing the Potomac, hesitated at Martinsburg, as if to return to Maryland, and the army of the Potomac east of the Blue Ridge was held uncertain of the enemy's intentions, the information obtained, and which went far to show, if it did not of itself fix their course, elicited for the corps the thanks of the commander of our army.

In the now (October 30) just finished movement of the rebel army threatening the right of the army of the Potomac, near the Rappahannock, it is stated that the first report of the enemy's design was made from the signal station on Thoroughfare mountain many hours before the counter movement of our army was needed.

In the movements of the enemy, last spring, on the Nansemond, in the department of Virginia, a detachment served continuously with our forces.

In North Carolina a detachment of the corps has served in all great operations since the attack on Roanoke island.

Since the last annual report, the marked service of this detachment has been in the movement on Goldsboro', in the attack by the enemy on the fort opposite Newbern, and prominently when General Foster, besieged at Washington, was cut off by the enemy's batteries from other direct communication with the relieving gunboats.

In the department of the south the officers of the corps have served in almost every engagement since the occupancy of Port Royal, their services culminating in those rendered in the expedition against Charleston, and those at the existing siege of that city, in which, for the now hundred days of its continuance, the service of the corps in all its branches—the use of the field telegraph lines in the trenches, its communication with the naval forces, and its duties of observation and report from towers and lookouts—afford an example of what the duty ought to be everywhere, and of the efficiency to which the corps can be brought when its officers are supported by that official confidence which is their right.

In the department of the Gulf the corps has served since soon after the first occupancy of New Orleans by General Butler. A detachment now accompanies the forces of General Banks, in the pending movements in Louisiana. These officers opened the first direct communication from the Upper with the Lower Mississippi, when Rear-Admiral Farragut, running past the batteries of Port Hudson, found himself, after the perilous passage, cut off above that fortress from the vessels of his fleet, which could not follow him, and were lying in the stream below.

There is not, perhaps, on record a feat of aerial telegraphy such as that thus and then performed, when from the topmast of the flag-ship of the admiral, lying above the fort, messages were regularly transmitted past the guns of the fortress to a station on the mast-top of the war-vessel Richmond, five or six miles below. An official letter of Captain James Alden, commanding the naval forces near Baton Rouge, Louisiana, states that the value of this service at this juncture "can hardly be overestimated." This service, I believe, was also officially recognized by Admiral Farragut.

Through the prolonged siege of Port Hudson the co-operation of our land and naval forces was assured by this party. The reports are interesting. They illustrate the signal service at this siege, the difficulties under which it was given, and its value.

In the department of the Tennessee a detachment of the corps has served, in the past year, since the first attack on Vicksburg and the subsequent attack against Arkansas Post. In the progress of the grand siege of Vicksburg the officers of this detachment—it being then just collected, and serving with all the disadvantages of an acting organization—rendered such aid as they could. They were stationed on the vessels of the fleet, and with the troops at different points on the banks of the river. In the passages of the Vicksburg batteries, by our steamers running the blockade, signal officers were stationed on the vessels, and shared the risks of the exploit.

When, in the movements turning Vicksburg, the Mississippi river was to be crossed by our army near Grand Gulf, the stations of the corps were opened on the opposite banks of the river. In the marches and battles which followed, and at the battle of Champion Hills, the party serving with General McPherson had the distinguished mention of that officer. At the first investment of the city, it fell to the corps to keep the communication between the wings of our army and the naval forces above and below that fortress—a service at that time of importance. As the siege was prolonged, their service (though necessary, and of a character that their default might have caused serious loss to our arms) was not altogether satisfactory. Their field telegraphic trains, delayed at Memphis, did not reach them. The officers, reporting, deplore that such an opportunity for their service was lost.

A signal party took part in the operations in the Yazoo, in the descent of Admiral Porter to join Admiral Farragut at Red river, and in most of the joint operations of the land and naval forces. A small detachment also served successfully with General Ellet's marine brigade.

In the department of the Cumberland, the detachment there stationed was present at the battle of Stone river. It is reported by General Rosecrans to have "done well." The field telegraphic trains had not then reached them.

At the occupation of Murfreesboro', and in the operations in that vicinity, in the spring and summer, the party has been kept at work on stations of observation and of communication. In the attack by the enemy on Franklin, it reported the need of aid when the message could not well have otherwise gone. During the movements on Chattanooga, the line of signal stations is reported to have extended, at one time, a distance of eighty miles. The officers seem to have deserved, and gained, the confidence of General Rosecrans, who then commanded the department.

A detachment now accompanies General Burnside in Eastern Tennessee and Kentucky, and smaller parties are with expeditions in Louisiana and Arkansas, and at different points along the Mississippi.

There are above stated, cursorily and in brief, some of the instances of service selected from those mentioned in the mass of reports and the correspondence on file at this office.

In a year's service, embracing occasions almost innumerable, and covering such vast operations as those in which these parties have striven to take a part, there must be many incidents of failure and of disappointment. The accounts of these would not always come to this office clearly, and sometimes not at all. The department has before it the data as they have been given to me. To arrive at fair decisions of general value, it is proper—certain successes being known to have been accomplished—to contemplate what disasters might have happened to our arms, and, by consequence, to the general success of our armies, had the aid acknowledgedly given in any one instance failed to have been there given. I am of the opinion that it can be held, in behalf of those whose time and labor have been devoted to this duty, that their service has been fully as arduous, and at least as successful, as the general duty of that of any the same number of persons in the army.

LEGISLATION.

The legislation of the last Congress providing the organization of the corps has had a good effect upon its service. It placed within the reach of many deserving men positions they had fairly earned by labors in the field.

Amounting, as it did, to a recognization of past services, and the pledged promises of the United States that those who were found worthy might, through it, obtain positions in a corps to which they had become attached, and in which they had freely risked their lives, shut out from other avenues of distinction, it encouraged all, and led to renewed labors, with a reasonable hope of reward to be won by merit. This legislation has provided for the present wants of the corps. The pay is liberally fixed, and the grades of rank and the duties are properly established. The rules for entering the corps, either by commission or through the ranks, are so drawn as to open the highest offices to the aspirations of all. There is every proper incentive which law can give to induce valuable men to the employ, and to lead them to a faithful discharge of their duties. There is placed in the hands of the Executive that control of the organization, and of its duties, which is right, at the inception of a service which was at first only experimental. There is given to the corps all that is asked for or required; until this law has been once tested, by filling the corps to its best organization, and putting it in service, under the law, the results of success to be expected from its working, or the duties of the corps it provides, can be estimated only in imagination. I am of the opinion that no other legislation is needed. If the law, rightly construed, is carried out, and the corps thereafter be wanting in success, the fault will be either in the officers who control it, or with the material that represents it in the field.

PROGRESS OF ORGANIZATION OF THE CORPS.

In pursuance of the act of March 3, 1863, which provided for ,the organization of the signal corps of the army, a board of officers were convened on April 13, 1863, by order of the War Department. The importance of the business to be brought before this board had induced the request, on the part of the signal officer of the army, that its members should be officers of known character and acquirement. I do not think the selection made by the War Department could be improved, or that a body of officers could be found to more considerately and faithfully discharge their duties, or with a more conscientious regard for the interests of the service, than that which has actuated these gentlemen through the prolonged sessions of the past summer. The order convening the board has been modified from time to time by the War Department. The board has acted with its best judgment to carry out its provisions. It was made a part of their duty to report on a plan of organization of the corps, and on other matters pertaining to its duties, as their military experience and their opportunities for investigation might suggest. This report has already been submitted to the War Department.

This report has been made by the board after due consideration, and with full access to the records of the office, the official reports, papers, and other information to be there obtained in regard to the history of the corps, its duties, and its progress from the beginning of the war. I fully concurred in the recommendations of this report, and I respectfully advise their adoption.

The duties of the examination of officers and of recommendations for appointments, which devolved upon this central board, were of a delicate character. It was their province to discriminate between officers who have served gallantly and zealously from the beginning of the war and to fix their grades of rank and relative standing. The lavishness with which, in the early days of the war, positions of rank were distributed, sometimes without regard to qualification, increased the difficulties of the task. It was necessary to recommend a reduction of rank in some cases, in others candidates were found disqualified to enter the corps. There were few prominent positions provided by the law; the aspirants were numerous, and the claims of each, in his own estimation, eminent. The qualifications, record of service, and conduct of each applicant were the basis on which to fix his standing. In this task of decision the board has proceeded with patience, kind consideration, and impartiality. The result of their action will be to render justice in the lists they present, in so far as is possible with human judgment. On July 17, 1863, orders issued from the War Department for the formation of other boards in the different military departments, with a view to the examination of the officers then serving, and to expedite the organization of the corps. The constant moving of the great armies, with which the officers are in the field engaged, in battles, marches, and sieges, have rendered it impossible to collect the reports of these boards rapidly, or for the boards to continue in permanent sessions. Their meetings have been in tents, and, in the case of the board assembled on Morris island, its sessions were held during the siege of Fort Wagner, and nearly within the range of the enemy's artillery. The reports from the departments of Virginia, North Carolina, South Carolina, and the Gulf are now complete. Those from the departments of the Tennessee and of the Cumberland, though partially rendered, are not yet finished.

Boards for the examination of non-commissioned officers and of enlisted men have also been convened in each military department. Their recommendations for sergeants and privates of the different classes are received. These boards retain their organization for the examination, under the law, of such enlisted men as may be enlisted in or transferred to the corps. On August 1, 1863, in accordance with authority from the War Department, a board convened at the camp of instruction, in Georgetown, D. C., for the examination, for admission to the corps, of such candidates (coming either from military or civil life) as might be properly brought before it. It has been the rule of this office, as it has been the understood wish of the War Department, to throw open these examinations for the widest and fairest competition; to refuse to no respectable citizen of the United States permission to appear before the board, and to be guided solely by the decision of the board as to the recommendation of his appointment. The action of this board, on which no influences are brought to bear, is impartial. The wide field for selection affords opportunity to obtain the best material. The qualifications of the applicants who have thus entered the corps have warranted the plan pursued. It is proper that the precedent thus established should be followed hereafter.

The organization has proceeded slowly, and with the difficulties necessary in such times as now. The papers, returns, and reports have had to be, some of them, devised, and all of them systematized. It has been necessary to impress upon the officers, scattered throughout the United States, the fact of their accountability, and the necessity of rendering such reports and papers as the usages of the service require. An acting organization of equipped officers and men has had to be kept everywhere in the field ready for service, and detachments of it moved from point to point, as, in the immense campaigns, (including those of all the armies,) new contingencies developed themselves. The views of this office have not always been those which seemed wise to the department, and, for the plans proposed from it, there have sometimes been substituted those suggested by others. The perplexities have been numerous; there has been little time for consideration, and a necessity of constant action. The officers serving in the different military departments have had their embarrassments. They have been perplexed about the formation of boards and the examinations to be passed. Persons illy disposed have annoyed them by discouraging reports as to the organization of the corps. There have been the uncertainties, the little collisions, dissatisfactions, and hamperings to be expected in any incomplete organization.

By this review there is offered to the War Department an opportunity of estimating the difficulties under which the operations of the corps have progressed. The general tone of feeling among the officers has been commendable. The acting organizations have maintained and tried to perfect themselves in every department. The records of the campaigns show that they have not been idle. Everything has been made to give way to active service in the field. Very few, if any, of the corps have stopped to consider how it might affect their chances of appointment to have the lists hurried into the department when there has been an opportunity anywhere to show by their deeds that such appointments would be for the interests of the service, and that they were deserved. I recommend that no detriment be allowed to happen to any officer or man on the lists thus delayed. The necessary papers, lists, &c., are now so nearly complete that the corps can be put on a permanent working organization in a very few days after the receipt of the reports from the departments of the Tennessee and the Cumberland. The recruiting service is organized and proceeds satisfactorily.

ORGANIZATION OF THE OFFICE OF THE SIGNAL OFFICER.

By the legislation of last session Congress provided for two clerks of class two in the office of the signal officer. With the appointment of these clerks, the office assumed a permanent organization. This office has been, since soon after the beginning of the war, an office for records; for the issuing of orders; a purchasing and disbursing office; an office for the issuing of supplies to officers, and for the auditing of their accounts; the headquarters of the corps; and virtually a bureau office. The records of the corps are now complete. Since April 1, 1861, the office has issued all necessary supplies to each chief signal officer in the several military departments of the United States.

The property accounts of signal officers, with one or two exceptions, have been rendered and examined to September 30, and are (to the number of one thousand) in the hands of the Second Auditor. When the difficulties peculiar to duties of such varied kinds, with a new army in time of war, and an organization made up of volunteers, are considered, a result of this character is cause for satisfaction. The credit for the systematic arrangements, and the precision which have made it possible, is due to Messrs. White and Ashley, the appointed clerks, upon whom has devolved the real labor, and to the energy and care of Captains Cushing, Hepburn, Spencer, and Tafft, who have been on duty at different times since the establishment of the office. The office organization is now complete for any possible extension of its duties.

PLANS AND DEVICES.

A number of plans or devices having reference to aerial and electric telegraphy have been, during the past year, submitted to this office. A detailed account of these cannot properly accompany this paper. The number of plans and of models submitted have rendered it necessary that a general rule should be adopted in reference to them. It has been the usage, for this reason, to submit each to a board of officers for examination and report. This report, with the writings, models, and plates accompanying each device, are directed to be kept on file in this office for reference. Among the plans submitted have been ingenious devices for signals, and for ciphers, signal torches, rockets and signal lights of various construction; specimens of insulated wire, of double wire, and of wire twisted to be made flexible; different varieties of electric instruments for field use; plans for field trains, observatory towers, &c.

The war has brought forward numerous inventions for this service.

The different varieties of apparatus carried with our armies in the field, crude as some of them are in this the first year of their use, have been the subject of attentive study by the agents of different foreign powers who have visited our encampments.

INSTRUCTION AT MILITARY AND NAVAL ACADEMIES.

The course of instruction commenced at the Naval Academy at Newport, Rhode Island, to which reference was made in my last report, has been continued, as I am informed, at that institution during the past year. A communication from Lieutenant Commander S. B. Luce, United States navy, the officer charged with the duty by the Navy Department, states: "At the coming June examination, twenty-one (21) midshipmen leave the academy for active service. I shall make a special report of the fact to the department, that they may be sent on board different vessels, and thus the entire number be made available at once. In October next thirty-one (31) more midshipmen, competent to act as signal officers, leave the academy, and the wants of the navy will be in a very great measure supplied."

Practical illustration of the progress and skill of the 2d class were, I believe, given before the board of visitors at the annual examination at the Naval Academy of this year.

In July last instruction in military signals and telegraphy was made, by an order of the War Department, part of the course of instruction at the Military Academy at West Point. Captain Samuel T. Cushing, acting signal officer, with proper assistants, were detailed for this duty. The course has been ably conducted by this officer. It has embraced instructions in the drill and management of signal parties, the theory and practical use of aerial and electric telegraphy, and a thorough field practice with the field-line modes used in the army. At the last report of the officer on duty, the first class of cadets had so far advanced as to read easily, by day or by night, communications telegraphed with flags or torches, from Newburg to West Point, a distance of eight miles. They have studied, by practice, the working of the light field telegraph lines, which come within the management of the corps. The course to be conducted by Captain Cushing and his assistants would embrace practice on these lines and the modes of working them in common use. The addition of this branch to the studies before pursued at the Military Academy promises, in my opinion, an advantage to the service.

The use of field signals and field telegraph lines has now become so common in military operations that an officer can hardly be considered instructed who is not informed as to their employment. This especially applies in the existing war.

The land and naval forces of the enemy seem to be well supplied with practical signal officers, and military operations on land bring our forces continually in view of hostile signal stations, of whose powers our officers ought to be able to judge. The accounts which reach us of the rebel navy at sea indicate the habitual use of those plans of signals first introduced in our armies. The officers of our navy, experienced in this war, will be able to estimate the advantages thus gained.

FIELD TELEGRAPHS.

The service of the field telegraph trains, in the hands of the corps, and making part of its equipment, has been conducted with a fair and, in some instances, a marked success in the different military departments. The liberality of the War Department has allowed a development of this branch of the duty greater than was recommended at the date of my last report, and with results which have justified the action. It remains, in my view, only to follow the path of development indicated by the experience of the past year to secure for our armies a service of field telegraphs, with portable lines, so superior as to render our advance in improvements of this character as notable as those which have marked the progress of our armies in other branches of military appliances.

In my last annual report there was brought to the attention of the department the improvement in telegraphic apparatus which the ingenuity of American artisans, stimulated by the field opened to them by this war, and the call for improved equipments for the trains for the signal corps of the army, had inaugurated. The practical experience of the past year, indicating the wants of the service, and the same ingenuity constantly exercised to overcome these wants and to perfect the material, have led to developments in the art which are now attracting the attention of electricians, and which, if they fulfil the promise of their seeming, will go far to revolutionize the appliances for the transmission of signals by electricity. It is already a subject of consideration whether the appliances and the modes of generating a magneto-electric current, as first used for telegraphy in this country, in the experimental instruments made for the signal corps to dispense with the clumsy and untransportable voltaic battery, are not these appliances and that mode which will be necessary to transmit signals through sub-marine cables of uncommon length, as that proposed to cross the Atlantic. This is, of course, theoretical only.

The use of these instruments in the army has led incidentally to their examination for the naval force of the United States. Their use for civil purposes attracts attention. The ingenuity of the inventor, Mr. G. W. Beardslee, of New York, turned to the subject of increasing the powers of the instruments to enable them to work at greater distances, and to apply the magneto-electric current in the same manner as generated by the field machinery, under circumstances when with the first devised instruments it was difficult or impossible, has produced, with a construction novel in this country and in Europe, a signal-sounder, by which the signals transmitted are addressed to the ear; messages transmitted by this instrument may be read as with instruments of common usage.

Experiments have been ordered with this apparatus. If, as is the opinion of the inventor, it can be used at any great distance, and with the compact and perfectly transportable apparatus of the magnetic instruments of field trains, it promises a development of field telegraphy before impossible, and will favorably influence the telegraphic enterprises of the country. Should the experiments ordered warrant the course, the signal trains of the army will be equipped with both the dial instruments already in use and the instruments now mentioned. There are opportunities for the employment of both. It is with some gratification that the attention of the Secretary of War is invited to these results. The credit of whatever success shall hereafter attach, in civil or military use, to

American apparatus, based on these principles and on this style of its applications, will be largely due to that wise view of the War Department which first gave it opportunity for development.

During the past year there have been in the service of the corps thirty (30) field trains, distributed as follows:

In the army of the Potomac	5
In the department of the Cumberland	5
In the department of the Gulf	3
In the department of North Carolina and Virginia	3
In the department of the south	2
In the department of the Tennessee	6
In the department of Ohio	2
At the signal camp of instruction, Georgetown, D. C	3
At the United States Military Academy, West Point, N. Y	1
Total	30

Seventeen (17) have been distributed since May 1, 1863. Of these trains, some have been equipped with five and others with ten miles of insulated wire. There are carried in the trains lances for setting up the wire, when that is necessary; reels, portable by hand, carrying wire made purposely flexible for this particular use, and various minor appliances which experience has proven useful. A military organization is directed for each train.

In duty of this kind, the style of construction of the trains, the equipment they are to carry, and the military organization to be provided for their use, to enable them to be most rapidly and anywhere brought into action, are the subjects for study. The particular instrument to be equipped is for secondary consideration. The soldiers drilled to the duty of construction acquire in a short time a remarkable skill in the rapid extension of these lines. As was anticipated, they have proved valuable auxiliaries to the services of the corps, and have sometimes rendered them available when they would, without, have been impossible. The greatest reported distance at which the instruments have worked is something over (20) twenty miles. The average distances at which they are used are from (5) five to (8) eight miles. The average speed of the most rapid construction is reported to be at the rate of a slow walk.

At the first battle of Fredericksburg field trains were first in the history of the war used on the battle-field under the fire of the enemy's batteries. The movements to be made on the day of that battle were of the first magnitude. The movements of the retreat were perilous to the whole army. The trains in use contributed something to the success of these movements.

At the battle of Chancellorsville several lines were extended. The shorter worked successfully; the longer failed. This failure was not, however, wholly the fault of the officers in charge: success cannot always be commanded.

In the rapid movements of the army of the Potomac these lines aided materially in establishing that communication between the scattered army corps, which afterwards rendered their sudden concentration before the enemy at Gettysburg possible.

The siege of Charleston afforded a fair field for the use of these trains. They have been skilfully handled by the detachment of the corps there serving. The reports at this office would indicate their employment as a success. For the hundred days of the siege now past, the communications with General Gillmore's troops in the trenches and in reserve have been kept with field lines, pushed forward and maintained under the fire of the enemy, and advanced with the advance of our troops to the furthest point reached by our forces at Fort Gregg.

At the siege of Fort Wagner the lines were so close to the enemy that his sharpshooters fired at the wire. It was repeatedly cut by pieces of shell. The wire was mended by soldiers of the corps, who were exposed to a dangerous fire of grape. One of the first instances on record of a soldier actually wounded at the instrument is that of Sergeant Emerson, of the signal corps, who was severely wounded by a shell, which destroyed in its explosion the splinter-proof in which he was working in the parallel, and buried himself and Lieutenant C. F. Cross, the officer in charge, some feet in depth in sand. These instances are mentioned as illustrative of the mode in which the portable lines of the corps should be worked. Their use has been here, as elsewhere, supplementary to the use of the flags and the other aerial signals by which the corps keeps its communications.

Thus, while these communications existed in the trenches in front of Charleston, constant communication was kept with the fleet in the bay and the river on both flanks of the army, and from signal towers with different divisions of the forces. The portable lines, as can be judged by the dates at which their distribution commenced, have been so in use in the different departments that the results cannot at present be properly judged. There are only general reports from the departments of North Carolina and Virginia, the departments of the Gulf and of Tennessee. There are trains in the field having a part in the operations in each of these departments. The general tenor of the reports indicates a fair success.

A summary report in reference to the average working of this apparatus for the past year has been called for, and will be laid before the department. There have been, of course, as it was reasonable to expect, accidents, sometimes incompetent management, and such errors as were to be anticipated at the commencement and in the early progress of such a service. The service rendered, however, has not failed to be of very essential value. The equipment of the trains, while it can be improved, seems to be in its general character proper for the purposes intended, whilst the material carried by them has been useful.

Questions have arisen as to the distance at which lines can be worked by the instruments carried by these trains, and also as to the durability of the instruments. I am of the opinion that, with proper care, the dial instrument will be sufficiently durable for the purpose to which it will be put. The distance of working can be increased with improved instruments, or proper modifications of the apparatus. The expense attending this service is trivial compared with the results it is capable of accomplishing. With proper organization and management, I think it can be so reduced as to make it admittedly one of the cheapest as well as effective branches of the service.

The experience of the past year has thus confirmed the views before brought before the department at the outbreak of the rebellion, and in the annual reports of 1861 and 1862, of the importance to the signal service of field telegraph trains with portable lines; that is, lines to be transported with instruments and apparatus complete, and to be set up anywhere the exigencies of the service require. The service of these trains is a necessary branch of corps duty; and from the beginning of the war it has been aimed to perfect it. I recommend its further development. The facilities placed within the control of this office by the War Department, and the appropriations granted for the purpose at the last session of Congress, will permit it to be tested to its full efficiency.

I am, sir, very respectfully, your obedient servant,

ALBERT J. MYER,
Colonel and Signal Officer of the Army.

HON. E. M. STANTON,
Secretary of War, Washington, D. C.

REPORT OF COLONEL J. D. GRAHAM.

SURVEY OF THE NORTHERN AND NORTHWESTERN LAKES.

ANNUAL REPORT OF COLONEL J. D. GRAHAM, OF THE CORPS OF ENGINEERS, FOR THE YEAR 1863.

Office Survey of the Northern and Northwestern Lakes,
Detroit, October, 1863.

Sir: I have the honor to submit this my annual report, for the year 1863, on the continuation of the survey of the northern and northwestern lakes committed to my charge under the direction of the Engineer department.

At the date of my last annual report to the Colonel of Topographical Engineers, (October 31, 1862,) the field duties for that season, being the commencement of the survey of Green bay of Lake Michigan, had closed. Early in November all the field parties returned to the office at this place.

After storing the camp equipage, discharging the men of the topograghical and shore parties whose services were no longer required, and reducing the crews of the surveying vessels to the number necessary for watching them and the public property in the storehouse, the several assistants commenced the reduction and platting of their observations and field-notes. These duties occupied them during the winter and spring. The work was all laid down upon the proper scale preparatory to being embodied upon a general chart.

When any of the assistants had finished their portion of these duties before the time for again taking the field, they were employed in making the necessary reductions, from the original records, of the meteorological observations.

The draughtsmen, Assistants J. U. Mueller and Joshua Barney, were employed in their proper vocation. Assistant Mueller had nearly completed the drawing of the chart of the northeast end of Lake Michigan, including Grand and Little Traverse bays and the Manitou and Fox islands, when it was ascertained that some dangerous rocks existed to the southward of the South Fox island, having upon them only thirteen and sixteen (13 and 16) feet of water, which had not been developed by the soundings made during the field-work of the year 1861. Similar undiscovered obstructions were suspected to exist off the northwest end of the same island, and off the southwest end of Little or South Manitou island. The finishing of this chart was therefore deferred until these important points could be investigated by additional soundings. This has now been done, and the results have been added to the chart. Multiplied soundings at short intervals apart have given the positions of the two dangerous rocks off the south end of South Fox island. The most dangerous one, having only thirteen (13) feet of water upon it, is situated three and three-eighths (3⅜) miles from that end of that island. It is one-eighth (⅛) of a mile east of a line drawn tangent, to the east, of South Fox island, and at the same time tangent, to the west, of North Fox island. The other rock, having sixteen and a half (16½) feet of water upon it, is situated seven and three-eighths (7⅜) miles, on a course of south ¾ west from the south end of South Fox island. In approaching this island from the southward, if its south extremity be kept closed on the highest land on North Fox island, which will be done on a course of N.NE. ½ E. (true,) vessels will pass one mile to the west of the thirteen-feet rock, and two and a half miles west of the sixteen-feet rock.

The additional soundings made off the northwest end of the South Fox island, although made at short intervals apart, did not develop any new obstructions here, but confirmed the character of the soundings previously made.

From a single throw of the lead by the party under the charge of Assistant (now Captain) J. R. Potter, on board the steamer Surveyor, just at the close of the field-work of the year 1861, a small but dangerous rock was discovered, having but three and a half (3½) fathoms of water upon it, off the southwestern coast of Little or South Manitou island. From the most southern point of this island to this rock is SW. ½ W. (true) two and three-eighths (2⅜) miles. From the southwesternmost point or shore of this island to the said rock is S.SW. ½ W. (true) two and one-eighth (2⅛) miles.

Additional soundings were made in this vicinity, and also more to the westward off this island, but they did not develop the existence of any additional obstruction, but confirmed the character of the previous soundings.

• This chart, with the above mentioned additions, will be finished and forwarded to the Engineer department by the 20th of next month, November.

Assistant Barney has been employed on the chart of the head of Fond du Lac bay, at the west end of Lake Superior, and has made good progress in the drawing. It includes the entrance to Allouez and Superior bays, also those bays and St. Louis river as far up as Fond du Lac village. The work upon this chart is elaborate and much varied in character, requiring a corresponding increase of work for the draughtsman. We expect it to be completed and ready for the engraver between the middle of January and the first of February ensuing.

Assistant Barney was employed for three weeks, in August and September last, in making some necessary examinations of sites for beacon-lights, and of the condition of certain light-houses, on Lake Superior.

On the opening of spring of the present year the usual repairs and painting of the two surveying steamers, of the schooner Coquette, and of the surveying boats, was attended to.

In accordance with a programme submitted to the Engineer department, and approved by it, the active field duties for continuing the survey of the northern and northwestern lakes were resumed early in June. They consisted in a survey of Portage entry on Lake Superior, and a continuance of the survey of Green bay and its entrances, and a portion of the adjacent coast of Lake Michigan, south of the said entrances; also of surveys of the channels heretofore dredged on the St. Clair flats, and in Lake George of St. Mary's river.

SURVEY OF PORTAGE ENTRY, LAKE SUPERIOR.

This survey was assigned to Assistant J. U. Mueller, aided by Assistant E. S. Wheeler, with a party properly equipped. It was commenced, after establishing the camp and depot of provisions, and making the necessary preliminary reconnoissances, on the 20th of June, and was continued until the 8th of the present month of October, 1863.

This entry lies in Kewenaw bay of Lake Superior. The coast, from four miles above to four miles below it, was covered by soundings extending from the shore line out to a depth of six and seven fathoms into the bay. This will give all necessary information to vessels for approaching the light-house here, and for entering Portage river. The survey and soundings were then continued up Portage river to its head, including Portage lake, through which the river flows. They were also carried up Torch river from its mouth in Portage lake to its source in Torch lake, and up Sturgeon, Pike, and Pilgrim rivers as high as they are navigable for vessels of the lightest draught. The survey of Torch lake is yet to be completed.

This survey embraces the positions of the cities of Houghton and Hancock, and of the principal copper-mining establishments in their vicinity. The annual amount of copper shipped from these mines is immense, and constitutes the principal freight for a number of the largest steamers throughout the season of navigation on Lake Superior.

In the execution of this survey the following amount of work was done, viz:

Number of trigonometrical stations built and determined in position	143	
Number of sounding stations built and determined in position	102	
Number of marked sounding stakes fixed on the shores and determined in position	232	
Number of buoys for sounding lines placed out and determined in position	125	
Length of lines on the shores, &c., measured with the chain	52, 124	feet.
Length of lines cut out and cleared for measuring and for opening views to stations	22, 517	feet.
Number of theodolite pointings	3, 185	
Number of sextant observations for fixing the positions of sounding buoys	81	
Number of soundings taken	22, 075	
Length of marshy shore lines sketched between trigonometrical points	98¾	miles.
Number of observations on the star Polaris for determining the true azimuths of lines, and also the magnetic declination	3	
Number of base lines of lengths suitable for the triangulation: 1 principal and 5 for verification	6	
Number of tide or water gauges established	1	

Two or three weeks of next season will suffice for finishing the survey of Torch lake.

The reduction of the observations and the platting of the work of this party have already been commenced in the office here, and will be pushed forward with a view to the completion of a chart based upon this survey as early as practicable.

I herewith present a sketch, marked A, showing the extent of this survey. The portion surveyed is tinted.

SURVEY OF GREEN BAY, ITS ENTRANCES, AND THE ADJACENT COAST OF LAKE MICHIGAN.

For continuing the survey of Green bay, the work was apportioned to the several field parties as follows, viz.:

1. To Assistant W. H. Hearding, in charge of a party on board the steamer Search, was committed the duty of making the deeper off-shore soundings. In this duty he has been aided by Assistants W. T. Casgrain and G. A. Marr, and Sub-Assistant or Recorder A. R. Flint, the latter being employed to serve during the field operations for the season only. The work of this party began on the coast of Lake Michigan, four and a half (4½) miles southwest from the Bailey's harbor light-house, and covered that coast and the entrances to Green bay as far to the northeast as Pointe Detour, being a distance of fifty-two miles by a width sounded of eight to nine miles. The area thus covered is four hundred

and forty (440) square miles. This important survey has developed several concealed rocks dangerous to navigators, whose positions are now for the first time known and correctly laid down.

After completing this portion of hydrography, Assistant Hearding was instructed to transfer the Search with his party to Green bay, and cover with soundings as much of it as practicable during the remainder of the season, from its mouth upward. Good progress has been made in this latter portion of the work assigned to this party. Up to the first of the present month, it had thus covered, within this bay, an area of about four hundred and thirty (430) square miles, covering the "Whale's Back shoal," and extending as high up the bay as the Sister islands.

This party has also rendered important services in transporting the shore parties with their camp equipage and provisions, when it became necessary to move them from one point to another in the progress of their work.

The following is the extent of work which Assistant Hearding reports as accomplished by this party from the beginning of the season to the 30th of September, ultimo, inclusive, viz:

1 station built for the main triangulation of Green bay, with a centre post 37 feet high. Height of the observing platform from the ground 53 feet. Height to top of pyramid 58½ feet.

11 stations built for hydrographic observations, with centre posts, each 27 feet high.

1 do. with centre post 14 feet high.

1 do. with centre post 12 feet high.

1 do. with centre post 9 feet high.

4 water stations have been built and placed out on shoals, for fixing their positions and for sounding out their areas, with legs 33 and 55 feet long.

203 lines of soundings have been run.

1,929 miles of lines of soundings have been run.

2,639 deep-sea soundings have been made.

3,673 pointings or 7,346 readings of verniers of the theodolites have been made.

2,636 sextant angles for fixing positions of sounding buoys, &c., have been observed.

In surveying the Whale's Back shoal in Green bay, the following amount of work was done, viz:

18 buoys were placed out and the positions determined.

74 lines of soundings were run with the small boats.

1,405 soundings were taken.

37½ miles of lines of soundings were run.

Besides which, the steamer Search has been engaged on thirty-one (31) different occasions, in moving parties when it became necessary for them to advance with their camping stations, and in carrying to them provisions, men, and orders from the Superintendent. In performing these duties, in making soundings, and in towing the surveying schooner Coquette from Detroit to Washington harbor, at the mouth of Green bay, the steamer Search has run, the present season, up to the 30th of September, ultimo, an aggregate distance of five thousand and four (5,004) miles.

2. To Assistant O. N. Chaffee, with a party on board the steamer Surveyor, was assigned the duty of making the soundings in the shoaler water in Green bay and its entrances, which were suitable to the lighter draught of this vessel. This was after completing a survey of the dredged channel of St. Mary's river, which will be particularly mentioned in a later part of this report, and the additional soundings off the South Fox and South Manitou islands, mentioned in a previous part of this report.

Assistant O. N. Chaffee was aided in his duties by Assistants A. F. Chaffee and F. M. Towar, and Sub-Assistant or Recorder Henry Neill, jr., the latter being employed for the season of the field operations only.

During the present season this party has completed the inner soundings around Washington and Rock islands, including Washington and Jackson harbors, and has traced the shore lines of those islands. It has also surveyed and laid down a dangerous shoal lying three and a half miles off the east shore of Washington island, and had commenced to survey the southeast coast of St. Martin's island, when, owing to the roughness of the advanced season, it was directed to join Assistant Hearding in making the off-shore soundings in the Little Bay de Noquette. These two parties will have completed these soundings throughout this bay by the end of the present month of October, 1863.

The following amount of work had been done by Assistant O. N. Chaffee's party, on board the steamer Surveyor, while operating in and near the entrances of Green bay, during the present season, up to include the 30th of September ultimo, viz:

7 trigonometrical stations built.

83 buoys made, placed out, and their positions determined.

665 lines of soundings run.

17,275 soundings made.

752 miles of sounding lines run.

4,939 pointings of theodolites.

225 sextant angles observed.

118 sounding stations put up and their positions determined.

3 base lines for secondary triangulation cleared and measured.

1 base line for secondary triangulation cleared ready for measurement.

40½ miles of shore line chained and sketched.

7 miles of shore line cleared on St. Martin's island, ready to be measured.

3 observations on the star Polaris for azimuth.

7 sets of observations on the sun, with the sextant and artificial horizon, for time.

15 observations of the declination of the magnetic meridian.

1 water station erected on shoal and its position determined, to aid in accurately sounding out said shoal.

Besides the above, 2,157 miles have been run on general duty, including the moving of shore parties, coaling, &c.

3. To Assistant H. C. Penny, in charge of a shore party, aided by Assistant A. W. Unthank, was assigned the duty of surveying the shore line and making the in-shore soundings on the west coast of Green bay, from a point six miles southwest of the mouth of Cedar river to the mouth of Little Bay de Noquette, and thence of the western coast of that bay to the mouth of White Fish river at its head. This party had progressed as far as Sand Point, on that bay, on the 30th of September ultimo. This point is to be the southern terminus of the Peninsula railroad, to run from thence across the country to the mouth of Chocolate river in Lake Superior, with a branch to extend to Marquette. Assistant Penny has been instructed to continue his survey up to the mouth of White Fish river before leaving the field for the season.

Along this coast are many detached shoals, dangerous to navigation, which have been minutely sounded and correctly laid down. Some of them lie as far out as three and a half or four miles from the shore of Green bay, and the soundings have been extended out from the shore so as to embrace them.

The amount of work done by this party to the 30th of September ultimo is as follows, viz:

46,711 soundings made.

1,136 lines of soundings run.

963 miles of sounding lines run.
47 square miles sounded.
10 square miles of topography on shore executed.
11 miles of shore line surveyed.
1,814 pointings of the theodolities made.
2,212 vernier readings of the theodolites made.
78 sounding stations erected and their positions determined.
162 buoys placed out, to regulate sounding lines, and their positions determined.
51 sextant angles observed.
7 observations made for determining the true meridian.
24 readings of the magnetic needle made.

4. Assistant Henry Gillman was placed in charge of a shore party, and, aided by Assistant Lewis Foote, was instructed to survey the shore line and make the in-shore soundings along the eastern coast of Green bay, from Eagle bluff, where the shore work of last year terminated, to Table bluff, or the northern extremity of the promontory at the Porte des Morts entrance.

This coast line is very much indented, and embraces a length of thirty miles. It includes Eagle harbor, Sister bay, Ellison's bay, and Hedgehog harbor, and it is studded by a number of small islands and dangerous shoals, including Horse Shoe island, the Sister islands, the Horse Shoe reefs, and the Sister shoals. These were all embraced by minute surveys and soundings, which had to be advanced out, in the small boats, as far as four miles from the shore. The coast here alluded to is generally high, steep, and rocky, presenting more than ordinary difficulties to the surveyors.

The Horse Shoe reefs lie 2¾ miles out north from Horse Shoe island, and 3½ miles northwest from the main shore. They consist of ledges of solid rock and detached boulders, having only five (5) feet of water on them, while, within half a mile, twelve to seventeen (12 to 17) fathoms are found. The Green bay steamers run inside of these reefs, but outside of the Sister islands, which gives but a narrow track for them, and hence the great importance of having them and the other features mentioned laid down correctly on a chart.

The following is the amount of work done by this party in making this survey, which was completed on the 30th of September last, viz:

30 miles of shore line surveyed.
15 square miles of topography laid down.
41 square miles of minute soundings.
788 miles of lines of soundings run.
5½ miles of lines of sight cut out.
6 trigonometrical stations built.
94 sounding stations established and their positions determined.
113 buoys placed out and their positions determined.
1,722 pointings of the theodolites.
2,595 vernier readings of theodolites.
819 lines sounded.
30,431 soundings taken.
156 sextant angles observed in determining positions of buoys, &c.
9 observations on the star Polaris, made for determining the true meridian.
74 compass readings, to obtain the declination of the magnetic meridian.
2 base lines, suitable for secondary triangulations, cut out and measured.
4 camps established from which to operate.

After Assistant Gillman's party had accomplished the above-mentioned work, it was transferred to the east cape of Little Bay de Noquette, called Peninsula Point, and instructed to survey the eastern shore of that bay, including the in-shore soundings, to its head, at the mouth of White Fish river, which will be the common terminus of the work of this party, and of Assistant Penny's, for the present season.

5. Assistant J. R. Mayer was employed, in charge of a party, in the early part of the season, in making a survey of the site for the new light-house at Racine, Wisconsin, and its immediate vicinity. He was assisted in this duty by Assistant Paul Mayer. The expenses of this survey was borne by the light-house establishment. He was also assisted by Mr. Albert Molitor, whose efficiency, shown on this occasion, caused him to be selected to fill a situation as assistant, required for the lake survey.

The survey at Racine embraced the development of an extensive and dangerous rocky reef, lying 1¾ mile to the east of the present light-house, with a deep and capacious channel between them. A report upon it, accompanied by an extract from Mr. Mayer's unfinished map, was made to the Light-house Board on the 30th of June last.

On Mr. Mayer's return from his present field duties, this map will be completed and forwarded to the Engineer department.

After completing the above-mentioned duties, and returning to Detroit, Assistant J. R. Mayer was placed in charge of a party organized for a topographical survey of that part of the coast of Lake Michigan included between Table bluff, at the Porte des Morts entrance to Green bay, and Bailey's harbor. This survey includes also the in-shore soundings off that coast. In this duty he has been aided by Assistants Albert Molitor, Paul Mayer, and S. W. Robinson. In order to push forward this important work, and to make up for the time lost in taking the field, owing to the Racine survey, this party was divided into two sections, the first led by Assistant J. R. Mayer, and the second by Assistant Molitor, both being under the general direction of the former.

On the 21st of August, for reasons hereafter to be mentioned, Assistant Robinson had to be detached from this duty and assigned to the astronomical party employed in making observations for latitude and longitude.

The coast line above mentioned is very circuitous, being deeply indented by Rawley's bay, North bay, Dougall harbor, and Bailey's harbor. It is also exposed to the heavy sea from Lake Michigan during northeast, east, and southeast winds. By the end of September, ultimo, this party had reached North bay, and it will probably complete the shore line and topography, and most of the in-shore soundings, as far south as Bailey's Harbor light-house, by the close of the present season's field-work. Mr. J. R. Mayer's report, giving in detail the amount of work performed by his party, similar to that presented by the heads of the other parties, has not yet been received. The progress reported by him, and his well-known industry and accuracy, assure me, however, that he has come fully up to the proper standard in this respect.

6. Assistant D. F. Henry, after completing a survey of the dredged channel on the St. Clair flats, a particular account of which will be given in a later part of this report, was placed in charge of the surveying schooner Coquette and an organized party, and directed to proceed to Green bay and continue its triangulation, which he had commenced last year, and also to make the necessary reconnoissances for selecting a proper base line preparatory to its being cleared, graded, and measured. He has been assisted in these duties by Messrs. J. S. Dunning and J. H. Booth, who were engaged as sub-assistants or recorders for the season of the field operations only.

Before beginning the triangulation, and in some cases while this was going on, it was necessary to build up a sufficient number of well-braced stations of sufficient elevation to command distinct views for the theodolite across Green bay and down upon the islands in its mouth. This preliminary work must always occupy a considerable portion of the time of a trigonometrical party before the primary angles can be observed.

The following is the amount of work done by this party, in relation to the triangulation, to include the 16th of October instant, viz:

13 miles have been opened for lines of sight.

111 angles of the primary triangulation have been observed.

1,853 pointings of the theodolite have been made.

59 sextant angles have been read.

91 magnetic readings have been made to obtain the magnetic azimuths of sides of triangles, which, when compared with the true azimuths, will give valuable determinations of the declination of the magnetic meridians in various parts of the survey.

The operations of this party have made the frequent crossing and re-crossing of Green bay, and the frequent visiting of stations up and down its shores, absolutely necessary. Much valuable time has been thus lost from the use of a sailing vessel, (the schooner Coquette,) which would have been saved by the use of a steamer. Indeed, some of the best weather for observation has been thus unavoidably lost. In calms, the very best time for our operations, a sail-vessel cannot move at all, and with head winds she is almost as badly off. From these two causes of delay a carefully kept record shows that we lose, by the Coquette, an average of two days per week, which is two-sixths, or one-third of the working season. This, besides retarding our progress, renders the use of such a vessel, for active surveying purposes, very expensive. I would, therefore, earnestly recommend that another steamer, for which I have forwarded an estimate, be provided for this survey. The schooner could then be usefully employed in carrying coal for the steamers, and provisions for the several parties, to their respective depots for the working season.

THE BASE-LINE PARTY AND ITS OPERATIONS.

A considerable portion of the time of Assistant Henry and his sub-assistants has been employed the present season in the necessary reconnoissances and measurements for the selection of a suitable base line on Green bay.

The flat portion of the western shore, between the Menomonee and Peshtigo rivers, seemed to present advantages for a base line long enough for a general base of verification of the previous work of the lake survey, while it would be equally suitable as a local base for the Green bay triangulation. This ground was, therefore, in the first place, examined. It was found that a line of four and three-fourths (4¾) miles long could be obtained over ground nearly level; but it is so low, and much of it so humid, that much time would have to be spent in raising it to a sufficient height to produce a dry and uniform surface for the base measuring apparatus. For the immediate use required as a local base, this time could not be allowed.

Chambers's island was next resorted to, and here a very good local base, three and a third (3⅓) miles long, was obtained running on dry ground, and not difficult to clear and grade. Being opposite to the Strawberry and Horseshoe islands, the triangles will be gradually and advantageously expanded to embrace them, and thence to reach Hat and Green islands, and also the Sister islands, preparatory to being still further expanded so as to reach both the shores of Green bay. This base was, therefore, selected. The clearing and grubbing upon it had progressed well, up to the 16th instant, and Assistant Henry reports that he expects to have it graded and measured before leaving the field the present season.

It was the 20th of July when the selection of this base line was determined on. An effort was then made to raise a working party for clearing, grubbing, and grading it, but it was in the midst of the harvest season, and such was the scarcity of laborers for hire that we were unable to raise a party for this object until the 28th to 31st of August. But for this circumstance, the preparing and measuring of this base line would have been completed by the beginning of the present month.

DETERMINATION OF LATITUDES AND LONGITUDES.

During the operations of 1862, as was stated in my annual report for that year, the following positions in and near Green bay were determined in latitude, viz:

1. Fort Howard, on Fox river, near the head of Green bay.

2. A station on Green island, in Green bay. Also, the position of the new light-house, since erected and lighted, on that island.

3. A station on Rock island, in the mouth of Green bay. Also the position of the Pottawatomie light-house on that island.

During the present season the longitudes of those stations, and also the latitudes and longitudes of the following stations in and beyond Green bay, will have been determined, viz:

4. Oconto, on the west shore of Green bay, about midway between Fort Howard and Green island.

5. A station on Washington island, in the mouth of Green bay.

6. A station on Bay de Noc bluff, near the east cape of the entrance of Big Bay de Noc, in Green bay.

7. A station on South Manitou island, in Lake Michigan, forty-five (45) miles east of the *Porte des Morts* entrance to Green bay.

8. A station near the light-house on the southeast end or head of Beaver island, in Lake Michigan, fifty (50) miles northeast by north from station 7, and seventy-two (72) miles east northeast, one-half north, from the said entrance to Green bay.

For the determination of these positions the accompanying instructions, marked A, were issued to an astronomical party organized at the beginning of the season and placed under the charge of Assistant James Carr. This party was divided into two sections for the co-operation required by the instructions. The first section was headed by Assistant Carr, who was aided by Assistant O. B. Wheeler, with Mr. William Le Baron as recorder. The second section was headed by Assistant E. P. Austin, aided by Assistant William Mendenhall. The observations for latitude were, as heretofore, on the lake survey, made with the zenith telescope, provided with a delicate spirit level and double line micrometer. I should have been desirous to have combined with this method observations of the transits of stars over the prime vertical, but we had not a sufficient supply of transit instruments for the purpose.

For determining differences of longitude, each section occupied a different station in the line of progression adopted, and each determined the local time at his station by observing the meridian transits of stars. On the same nights with these observations each party observed and noted by his chronometer the instantaneous signals produced by flashing small charges of gunpowder, which was done by a third party from chosen heights visible from both astronomical stations. The difference of the well-determined local time, thus noted, is the difference of longitude between the two stations. This is a method which I had extensively and successfully practiced while directing the surveys on the part of the United States in co-operation with the British corps for the demarcation of the boundary under the treaty of Washington of August 9, 1842. By this method results are obtained appreciably as accurate as those by the aid of the electric telegraph, and it may be well resorted to where lines of telegraphic wires have not been erected.

Assistant Austin remained at the head of the second section through the operations of its first station (Oconto) only. He then left his post without authority, and, indeed, after an application for a leave of absence had been denied to him as inconsistent with the public interests, and had, on the 21st of August, to be discharged. This step deranged the operations, and made it necessary to change the organization of this section, and to modify that of the first section. Accordingly, Assistant O. B. Wheeler was placed in charge of the second section, and Mr. S. W. Robinson was detached from Assistant J. R. Mayer's party and assigned as assistant to Mr. Wheeler, and Mr. William Mendenhall was detached from the second section and assigned, in Mr. Wheeler's place, as assistant to Mr. Carr.

The Peninsula railroad, to run from Sand point, on the west shore of Little Bay de Noquette, across to the mouth of Chocolate river, in Lake Superior, will probably be completed and in operation in July next. It will be provided with a line of telegraphic wires. We propose, then, to determine the longitude of its southern terminus at Sand point by gunpowder flashes to connect it with one of the stations already determined, and then, by means of the telegraph, to connect in longitude with the northern terminus on Lake Superior. Having done this, it will be very easy, by means of the gunpowder signals, to extend our determinations in longitude all over the shores of Lake Superior, which presents high, commanding bluffs very favorable to this operation.

I herewith present a sketch, marked B, showing the extent of our survey up to the present date in Green bay and its entrances, and on the adjacent coast of Lake Michigan. It furnishes data for a very valuable chart which will expose to the navigator many dangerous rocks and shoals not heretofore known. It will also show, minutely, the two principal entrances to Green bay, namely, that called "*La Porte des Morts*" (death's door) and the Eastern, or Rock island, passage.

The completion of the Peninsula railroad will cause an immense concentration of commerce and navigation through this last-mentioned passage. It will divert from the circuitous route now pursued by way of the St. Mary's river channel a vast portion of the trade between the lower lakes and Lake Superior, which must enter Green bay through this passage, on the direct route to the point of transhipment at Sand point.

The tinted portion of the sketch shows what is already surveyed. It will be perceived that there is a small untinted portion from near the southeastern shore of St. Martin's island to Big Summer island, and thence to Pointe Detour. This space includes, however, only inferior passages used by small coasters. These passages will be surveyed next season. The whole of Big Bay de Noc remains also to be surveyed.

SURVEY OF THE ST. CLAIR FLATS CHANNEL.

In May of the present year the usual periodical survey of this channel was made by a party placed under the charge of Assistant D. F. Henry, aided by Assistants Gillman and Casgrain. A new map was constructed exclusively from this survey, which embraces a width of 1,800 feet, or 900 feet on each side of the axis of the dredged channel, and extends out to a depth of thirty (30) feet off its northeasterly extremity, and to seventeen (17) feet off its southwesterly extremity. Besides the soundings, which are laid down in feet, there are five longitudinal sections given along the dredged channel showing the depth of water on each in the years 1860, 1861, and 1863, all referred to a common horizontal plane. There is also a sixth section showing at one view, in different colored lines, the depth along the axis of this channel in each of the years 1856, 1858, 1859, 1860, 1861, and 1863. This map will be immediately forwarded to the Engineer department. Assistant Henry's report upon this survey is hereto attached, marked B.

SURVEY OF THE DREDGED CHANNEL IN LAKE GEORGE, OF THE ST. MARY'S RIVER.

In obedience to orders from the Engineer department, the survey of this channel was embraced in the programme of this season's work. It was committed to the party under charge of Assistant O. N. Chaffee, on board the steamer Surveyor, whose organization has already been given.

This survey was executed in June, and embraced the improved channel, and also a width of 1,500 feet on each side of it. The soundings covered all this area, and were, besides, carried out to a depth of twenty-three (23) feet off the north end of the cut, and to twenty-six (26) feet off its south end.

Four of the old stations used in the former surveys of Lake George were found and used in this. At other points new stations of a permanent character were erected, as nearly as possible, in the positions occupied by former ones. The following amount of work was done in making this survey, viz:

5 triangulation stations were built, and their positions determined.
31 buoys were made, placed out, and their positions determined.
128 lines of soundings were run.
5,576 soundings were taken.
239 pointings of the theodolite were made.
53 sextant angles were observed.
1 new water-gauge was erected at Church's dock.

Immediately after performing this duty, Assistant Chaffee's party was obliged to proceed to the other field duties of the season. A map of this survey will, however, be made on the return of this party from the field, which will be early in the ensuing month of November.

I present herewith a statement, marked C, showing the number of the several lake survey charts that were issued gratis to navigators, &c., from this office and the distributing office at Buffalo, New York, during each of the last six years, ending in each case with the 1st of October, and also the number that had been thus issued prior to October 1, 1857, making an aggregate of 24,248. The number issued during the year ending October 1, 1863, was 4,084.

The value of these charts to those engaged in the navigation and commerce of the lakes is sufficiently demonstrated by the continued and almost daily demand for them.

I also present herewith an estimate, marked D, of funds that will be required for continuing the lake survey for the year, to commence on the 1st of July, 1864, and to end on the 30th of June, 1865, amounting to the sum of $136,855 10; also an estimate, marked E, of funds that will be required for the construction of an additional steamer, to be employed in the survey of the north and northwest lakes, amounting to the sum of $60,000.

FLUCTUATIONS IN ELEVATIONS OF THE SURFACES OF THE NORTH AND NORTHWEST LAKES.

Observations of water-level, showing the fluctuations in elevation of the surfaces of Lakes Ontario, Erie, Huron, Michigan, and Superior, and in Lake George, of the St. Mary's river, have been continued, as heretofore. The results of these observations for the year beginning the 1st of July, 1862, and ending the 30th of June, 1863, are shown in the tables hereto attached, marked F 1 and F 2. They embrace the following number of observing stations, viz:

On Lake Ontario, three stations.
On Lake Erie, three stations.
On Lake Huron, three stations.
On Lake Michigan, two stations.
On Lake George, of St. Mary's river, one station.
On Lake Superior, three stations.

By a comparison of these with the similar tables heretofore presented, thus embracing the period from 1859 to 1863, inclusive, the mean monthly rise and fall, and the relative heights of the waters of these lakes, will be readily seen. In addition to the rise and fall due to the supply, caused by the precipitation of rains and snows, to discharge, evaporation, and to fluctuations, produced by the varying winds, it will be perceived that there are peculiarities in each, which will prove interesting in a practical as well as scientific point of view.

In consequence of the topography, as well as the comparative shallowness of Lake Erie, the winds appear to have so great an effect on its fluctuations as to render it impossible to eliminate their influence by the usual bi-five-day means. It will be seen that on Lakes Superior, Huron and Michigan, the water was lower in 1863 than in any other year. In Lake Erie it was the lowest in the months of May and June of this year, and the highest in January, February, and March. In Lake Ontario it was lower in May and June of 1863 than in the same months of 1861 and 1862, but higher than in the corresponding months of 1860. The highest water during the series of observations was in 1859; this is very marked in Lakes Superior, Michigan, and Huron.

In Lake Superior the highest water was in 1859. In 1860 the water in this lake fell considerably. In 1861 its further fall was slight. From December to April of this year it was lower than in the same month of 1860, but from May to October the water of 1861 was higher than that of 1860. With the single exception of August, when the water was higher than in 1860, the water was lower in 1862 than all the previous years. In 1863 it was very much lower than at any of the other periods named, especially in April, May, and June, which are the first months of navigation.

At Thunder Bay island and at Tawas bay, in Lake Huron, the half-hourly and quarter-hourly observations have been continued both day and night the present year, as they were last year. They will terminate with the commencement of the ice at those stations the present year. They will then be taken up for reduction and discussion, and will, no doubt, expose results of great value in relation both to the diurnal and annual fluctuations in the elevation of the surface of this lake.

THE LUNAR TIDE IN LAKE MICHIGAN.

In my annual report to the Bureau of Topographical Engineers, of October 13, 1860, a memoir was presented, accompanied by extensive observations demonstrating the existence and also the character of a semi-diurnal lunar tidal wave in Lake Michigan. This report is printed in pages 547 to 961, of volume II of Senate executive document No. 1, of the 36th Congress, 2d session, which contains the War Department reports sent to the two houses of Congress with the President's message of December 3, 1860, and in the annual report from the Topographical bureau of that year. Additional remarks, showing that previous to the demonstrations thus presented the existence of a lunar tide in the American lakes was generally denied, were given in my annual report for 1861, and printed in the similar congressional documents for that year. To a proper understanding of these reports, it is essential that certain corrections of typographical errors therein should be made, as set forth in the accompanying documents marked from G 1 to G 4, inclusive.

The printing of the records of these observations alone occupies 363 pages, 8vo of that volume, as is shown by the table marked A 11 therein. Besides these, there are, in the table marked A 12, seven large sheets of closely printed figures, equal to 28 pages octavo, which contain a reduction, by interpolations, of the elevations of the lake surface, as recorded in mean solar time, in table A 11, to the elevations corresponding to exact half hour or quarter hour intervals of time, reckoned from the time of the moon's meridian transit, whether upper or lower, for each consecutive lunar half day embraced in the series.

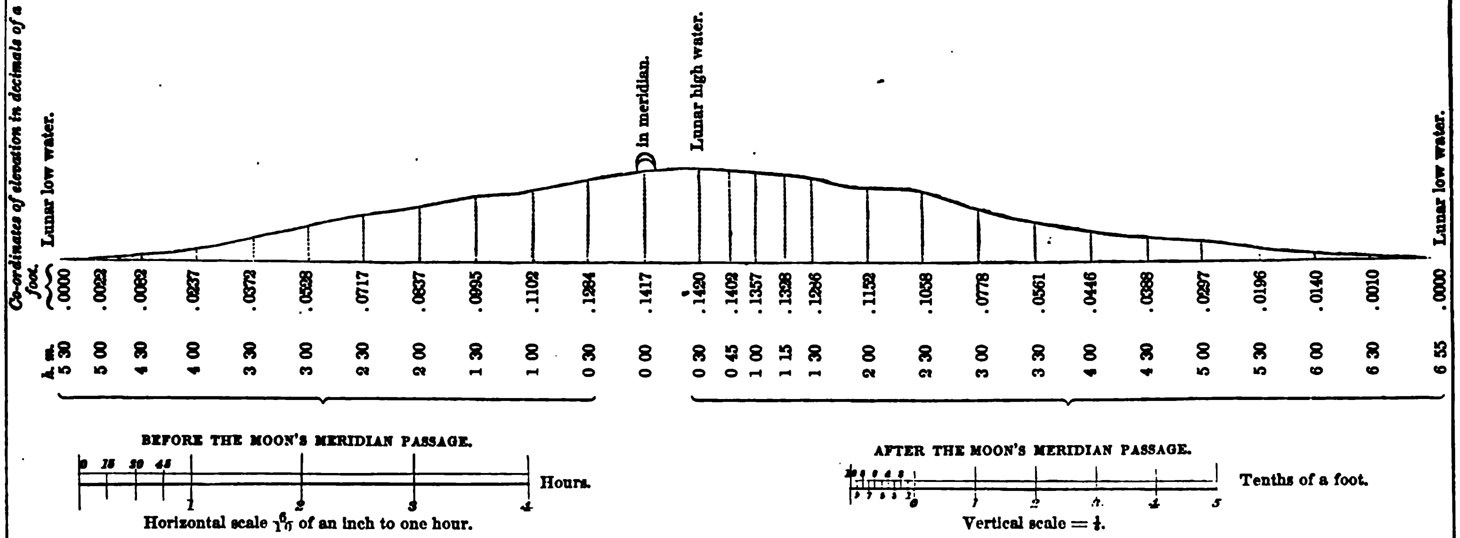
In treating, for the first time, so large a mass of figures, it could hardly be expected that all the deductions given in table A 12 would be entirely free from small errors of computation. Thorough and careful revision is always in such cases desirable.

For this, however, we had not the necessary time when the report of October 31, 1860, was presented.

Not being satisfied with the greater irregularity in that portion of the tidal wave shown in the drawings accompanying that report which represents the

FIG. 4.—LUNAR TIDE IN LAKE MICHIGAN.

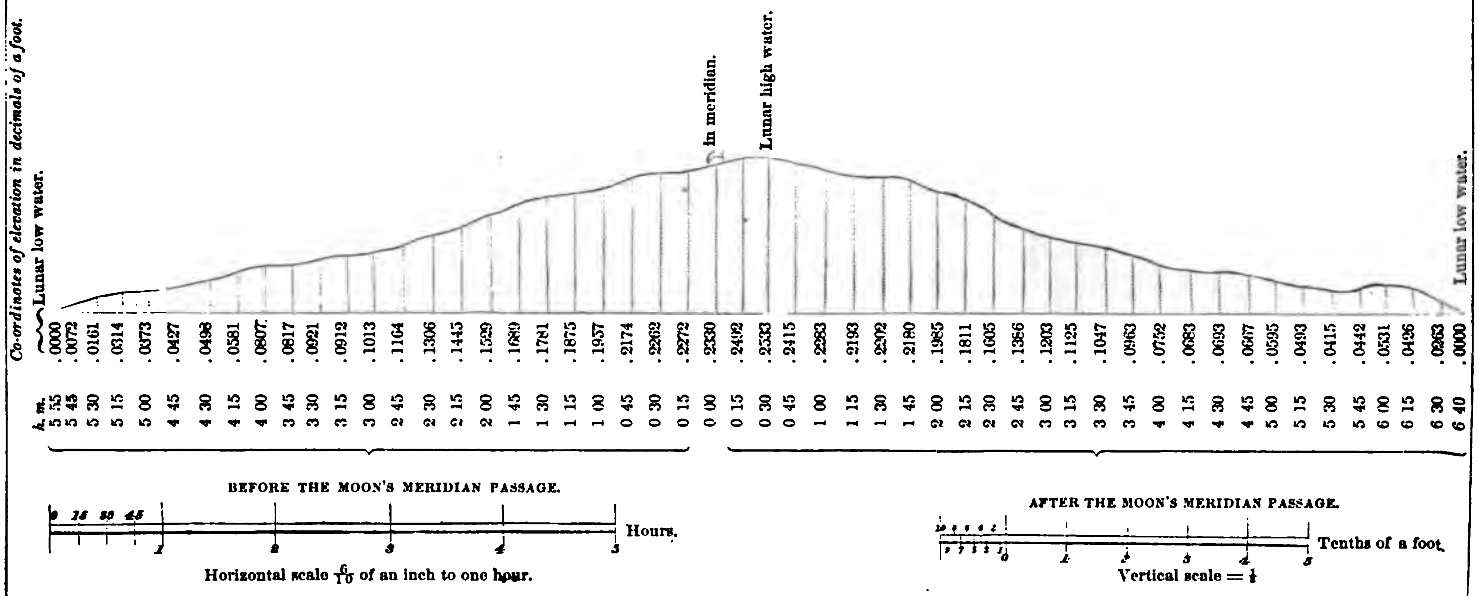
The average or mean result of all the observations, (9,184 *in number,*) *made half hourly, at Chicago, between the* 1*st of January and the* 1*st of July,* 1859.



NOTE.—Each co-ordinate of altitude is derived from a mean of 340 observations, and is expressed in ten thousandths of a foot.

FIG. 5.—LUNAR TIDE IN LAKE MICHIGAN.

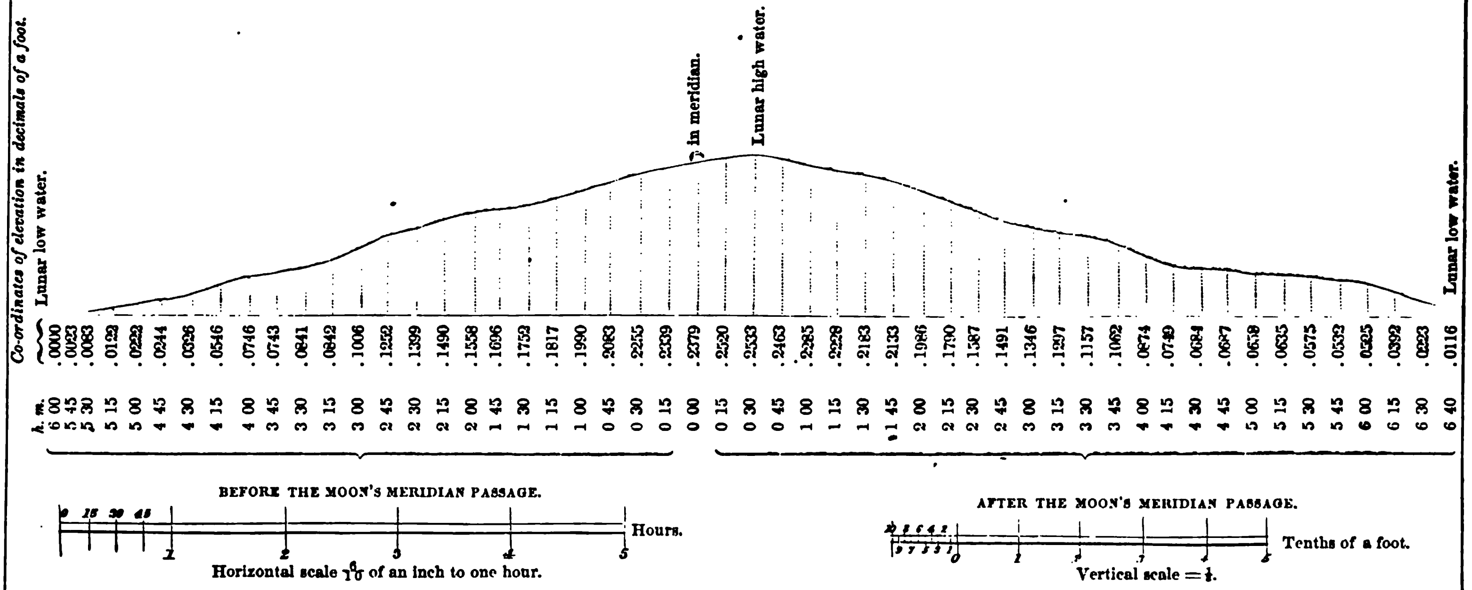
The average or mean result of twenty-four semi-diurnal spring tides observed quarter-hourly, at Chicago, between the 3d of January and the 2d of June, 1859, *based on* 1,224 *observations.*



NOTE.—Each quarter-hourly co-ordinate of altitude is here derived from 24 observations, and is expressed in ten thousandths of a foot.

FIG. 6.—LUNAR TIDE IN LAKE MICHIGAN.

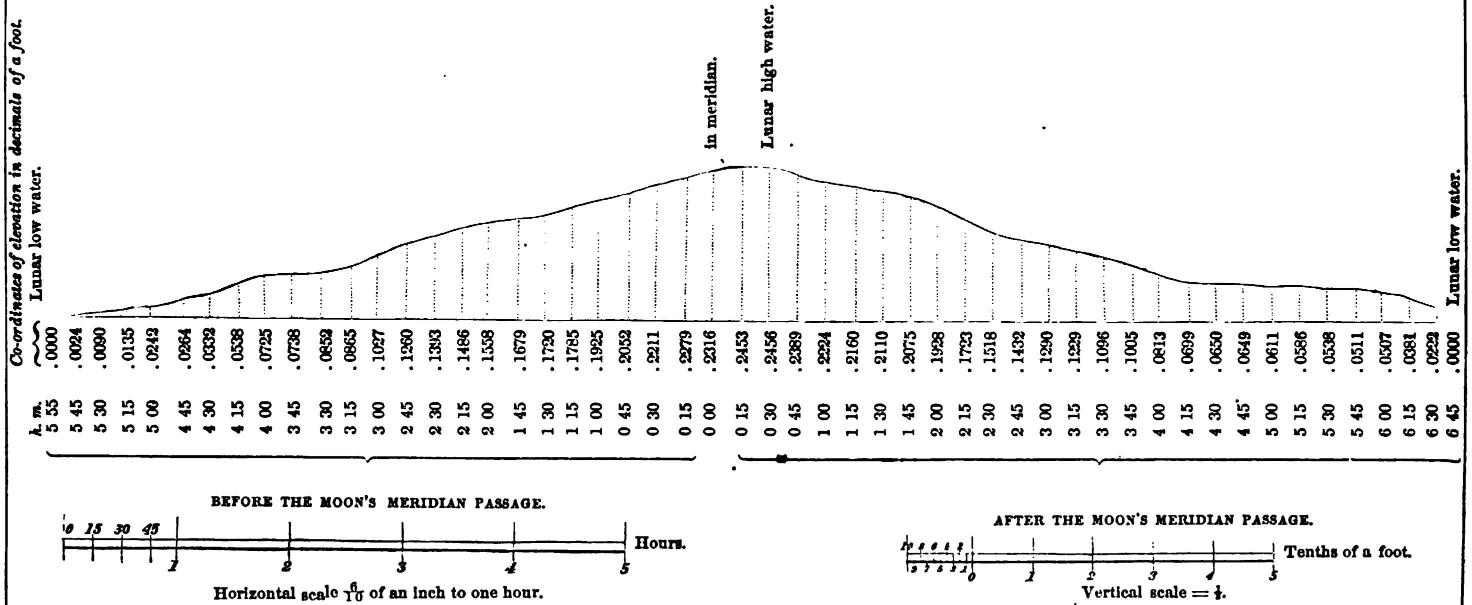
The average or mean result of twenty-six semi-diurnal spring tides observed quarter-hourly, at Chicago, between the 3d of January and the 30th of June, 1859, *based on* 1,326 *observations.*



NOTE.—Each quarter-hourly co-ordinate of altitude is here derived from 26 observations, and is expressed in ten thousandths of a foot.

FIG. 7.—LUNAR TIDE IN LAKE MICHIGAN.

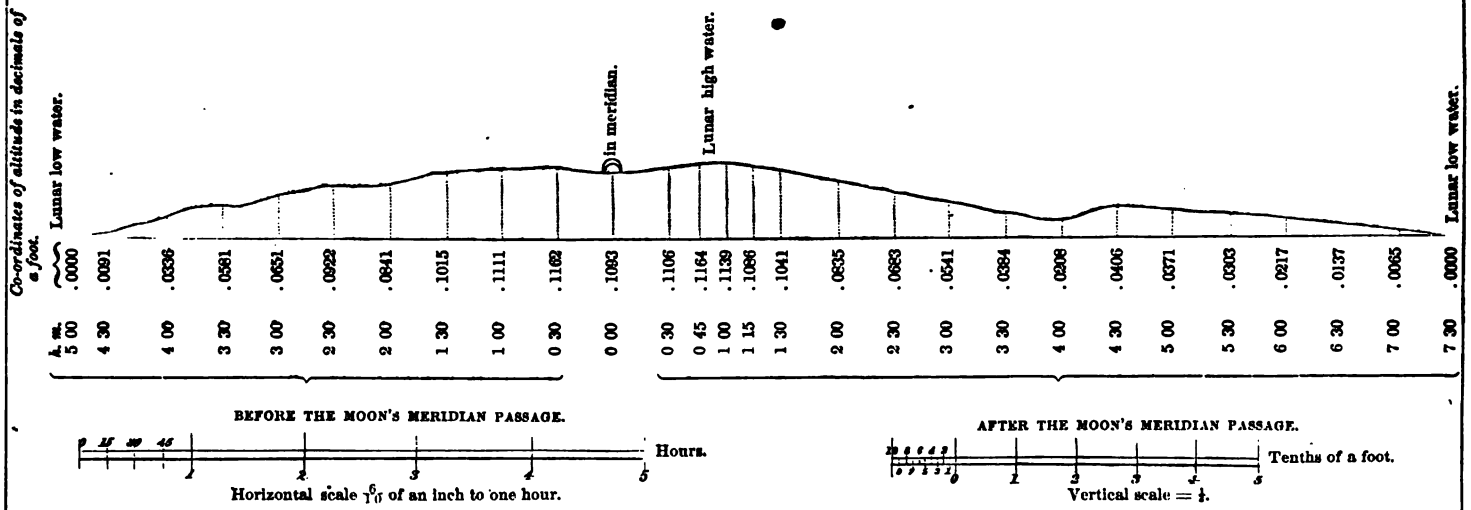
The average or mean result of twenty-seven semi-diurnal spring tides observed quarter-hourly, at Chicago, between the 3d of January and the 30th of June, 1859, based on 1,377 observations.



NOTE.—Each quarter-hourly co-ordinate of altitude is here derived from 27 observations, and is expressed in ten thousandths of a foot.

FIG. 8.—LUNAR TIDE IN LAKE MICHIGAN.

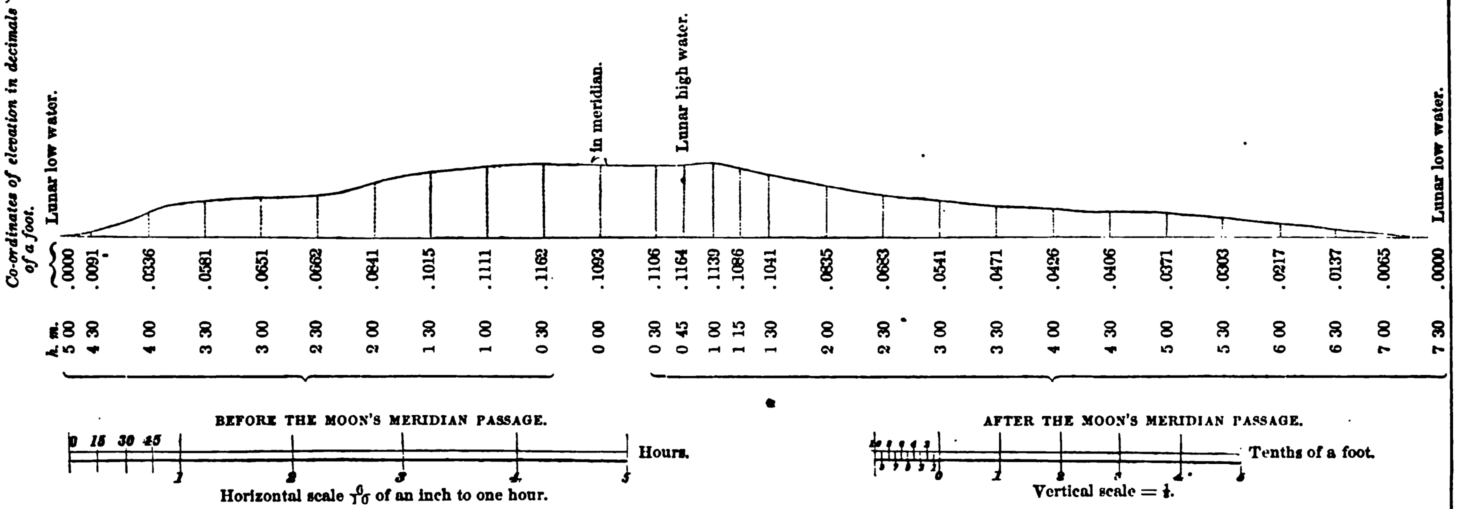
The average or mean result of twenty-eight semi-diurnal neap tides observed half-hourly, at Chicago, between the 11*th of January and the* 24*th of June*, 1859, *based on* 756 *observations.*



NOTE.—Each quarter-hourly co-ordinate of altitude is here derived from 27 observations, and is expressed in ten thousandths of a foot.

FIG. 9.—LUNAR TIDE IN LAKE MICHIGAN.

The average or mean result of twenty-eight semi-diurnal neap tides (rejecting 7 observations) observed half-hourly, at Chicago, between the 11th of January and the 24th of June, 1859, based on 749 out of the 756 observations made.



falling tide, than in that which represents the rising tide, we determined that a careful revision should be made from the original data of all the deductions which had been given in the table A 12.

This has been accomplished, and the corrected or revised results are now given in the new tables herewith presented, marked H 5, H 6, and H 7, and in the accompanying drawings marked figure 4, figure 5, and figure 6,* projected on a scale suitable for their being printed in wood-cuts within the space of an octavo page of the public documents.

From the conclusion shown at the foot of table H 5, we transfer the following co-ordinates of altitude with their corresponding time-intervals reckoned from the instant (before and after) of the moon's meridian passage. Each co-ordinate, expressed in decimals (ten thousands) of a foot, is derived from a mean of 340 observations.

TABLE H 8.—*Showing the half-hour (and in four instances the quarter-hour) co-ordinates of altitude of the average or mean semi-diurnal lunar tidal wave at Chicago, on Lake Michigan, derived from the whole* 9,184 *observations made between January* 1 *and July* 1, 1859.

	Mean solar interval of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
Before the moon's meridian passage.	5 30	0. 0000	Lunar low water.
	5 00	0. 0022	
	4 30	0. 0082	
	4 00	0. 0237	
	3 30	0. 0372	
	3 00	0. 0528	
	2 30	0. 0717	
	2 00	0. 0837	
	1 30	0. 0995	
	1 00	0. 1102	
	0 30	0. 1284	
Moon in the meridian	0 00	0. 1417	
After the moon's meridian passage.	0 30	0. 1420	Lunar high water.
	0 45	0. 1402	
	1 00	0. 1357	
	1 15	0. 1328	
	1 30	0. 1286	
	2 00	0. 1152	
	2 30	0. 1058	
	3 00	0. 0778	
	3 30	0. 0561	
	4 00	0. 0446	
	4 30	0. 0388	
	5 00	0. 0297	
	5 30	0. 0196	
	6 00	0. 0140	
	6 30	0. 0010	
	6 55	0. 0000	Lunar low water.

NOTE.—Each co-ordinate is here derived from a mean of 340 observations of the tide-gauge.

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* These numbers, to designate the drawings now presented, are in continuation of those which were used to designate the drawings which accompanied the report of 1860.

The results here presented in table H 8, and in figure 4, and derived anew from the original data contained in the extensive table A 11 of the report of 1860, while they verify the general accuracy of the mean tidal wave before given, (see figure 1 of the drawings accompanying the report of 1860,) show it to have more regularity of character throughout than was at first exhibited. They show, also, evidence of a more perfect elimination of the disturbing forces produced by irregular and varying winds than was at first shown.

Here the mean elevation of the tidal wave at its summit is shown to be one hundred and forty-two thousandths (.142) of a foot, whereas in table A 8, and in figure 1, of the drawings in the report of 1860, it was given as one hundred and forty-six thousandths (.146) of a foot, being a close verification.

The time of mean lunar high water, derived from this re-examination is the same as was before stated, namely, half an hour after the time of the moon's meridian passage.

The accompanying table H 6 is an extract from table H 5 of so much of the reductions newly made as embody the twenty-four spring tides which were exhibited in table A 13, and enumerated at page 591 of the congressional volume, in which the report of 1860 was printed. They are the following, viz:

At the new moon of January 4	3 tides.
At the full moon of January 18	3 tides.
At the new moon of February 2	3 tides.
At the full moon of February 17	3 tides.
At the new moon of March 4	3 tides.
At the full moon of March 18	1 tide.
At the full moon of April 17	3 tides.
At the new moon of May 2	1 tide.
At the full moon of May 16	1 tide.
At the new moon of June 1	3 tides.
Total number of semi-diurnal spring tides enumerated above	24

The result derived from the above twenty-four spring tides, as now shown at the foot of the revised table H 6, gives us the following quarter-hourly times and co-ordinates for projecting the curve representing the lunar spring tidal wave, as it now appears in the drawing marked figure 5, viz:

TABLE H 9.—*Showing the quarter-hourly co-ordinates of altitude of the average semi-diurnal lunar spring tidal wave at Chicago, on Lake Michigan, as derived from* 1,224 *observations made at and near the several periods of new and full moon between January* 3 *and June* 2, 1859.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
Before the moon's meridian passage.	5 55	0.0000	Low water of lunar spring tide.
	5 45	0.0072	
	5 30	0.0161	
	5 15	0.0314	
	5 00	0.0373	

TABLE H 9—Continued.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
Before the moon's meridian passage.	4 45	0. 0427	
	4 30	0. 0498	
	4 15	0. 0581	
	4 00	0. 0807	
	3 45	0. 0817	
	3 30	0. 0921	
	3 15	0. 0912	Slightly discrepant.
	3 00	0. 1013	
	2 45	0. 1164	
	2 30	0. 1306	
	2 15	0. 1445	
	2 00	0. 1529	
	1 45	0. 1689	
	1 30	0. 1781	
	1 15	0. 1875	
	1 00	0. 1957	
	0 45	0. 2174	
	0 30	0. 2262	
	0 15	0. 2272	
Moon in the meridian	0 00	0. 2330	
After the moon's meridian passage.	0 15	0. 2492	
	0 30	0. 2533	High water of lunar spring tide.
	0 45	0. 2415	
	1 00	0. 2283	
	1 15	0. 2193	
	1 30	0. 2202	Slightly discrepant.
	1 45	0. 2180	
	2 00	0. 1985	
	2 15	0. 1811	
	2 30	0. 1605	
	2 45	0. 1386	
	3 00	0. 1203	
	3 15	0. 1125	
	3 30	0. 1047	
	3 45	0. 0963	
	4 00	0. 0752	
	4 15	0. 0683	
	4 30	0. 0693	Slightly discrepant.
	4 45	0. 0667	
	5 00	0. 0595	
	5 15	0. 0493	
	5 30	0. 0415	
	5 45	0. 0442	Discrepant.
	6 00	0. 0531	
	6 15	0. 0426	
	6 30	0. 0263	
	6 45	0. 0000	Low water of lunar spring tide.

NOTE.—Each co-ordinate is here derived from a mean of 24 observations of the tide-gauge.

We have now from those twenty-four (24) spring tides two hundred and fifty-three thousandths (.253) of a foot for the height of the summit of the lunar spring tidal wave. In the report of 1860 it was given, from the same data, as two hundred and fifty-four thousandths (.254) of a foot, which is very near to an exact coincidence in the two results. The curve representing the spring tidal wave, as now shown in the new figure 5, is, however, more regular in its character than that shown in figure 3 of the report of 1860.

But the revision which has been made of the original observations, as at first given, the result of which is shown in the accompanying table H 5, enables us to bring into this category the twenty-six (26) spring tides enumerated in the accompanying table H 7, namely:

At the new moon of January 4	2 tides.
At the full moon of January 18	3 tides.
At the new moon of February 2	1 tide.
At the full moon of February 17	3 tides.
At the new moon of March 4	1 tide.
At the full moon of March 18	3 tides.
At the new moon of April 3	1 tide.
At the full moon of April 17	3 tides.
At the new moon of May 2	3 tides.
At the full moon of May 16	2 tides.
At the new moon of June 1	1 tide.
At the full moon of June 15	2 tides.
At the new moon of June 30	1 tide.
Total number of semi-diurnal spring tides above enumerated	26 tides.

The mean result derived from these twenty-six (26) spring tides, as shown by the footing of the table H 7, gives the following times and co-ordinates of altitude from which is projected the curve showing the lunar spring tidal wave, represented in the drawing marked figure 6.

This is based on 1,326 observations, and each co-ordinate of altitude is derived from a mean of twenty-six (26) observations of the tide-gauge, viz:

TABLE H 10.—*Showing the quarter-hourly co-ordinates of altitude of the average semi-diurnal lunar spring tidal wave at Chicago, on Lake Michigan, as derived from* 1,326 *observations made at and near the several periods of new and full moon, between January* 4 *and June* 30, 1859.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
Before the moon's meridian passage.	6 00	0. 0000	Low water of lunar spring tide.
	5 45	0. 0023	
	5 30	0. 0083	
	5 15	0. 0122	
	5 00	0. 0222	
	4 45	0. 0244	
	4 30	0. 0326	

TABLE H 10—Continued.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
Before the moon's meridian passage.	4 15	0. 0547	
	4 00	0. 0747	
	3 45	0. 0743	
	3 30	0. 0841	
	3 15	0. 0842	
	3 00	0. 1006	
	2 45	0. 1252	
	2 30	0. 1399	
	2 15	0. 1490	
	2 00	0. 1558	
	1 45	0. 1697	
	1 30	0. 1752	
	1 15	0. 1817	
	1 00	0. 1990	
	0 45	0. 2083	
	0 30	0. 2255	
	0 15	0. 2339	
Moon in the meridian	0 00	0. 2379	
After the moon's meridian passage .	0 15	0. 2520	
	0 30	0. 2533	High water of lunar spring tide.
	0 45	0. 2464	
	1 00	0. 2285	
	1 15	0. 2229	
	1 30	0. 2183	
	1 45	0. 2133	
	2 00	0. 1986	
	2 15	0. 1790	
	2 30	0. 1587	
	2 45	0. 1491	
	3 00	0. 1346	
	3 15	0. 1297	
	3 30	0. 1157	
	3 45	0. 1062	
	4 00	0. 0874	
	4 15	0. 0749	
	4 30	0. 0684	
	4 45	0. 0687	
	5 00	0. 0658	
	5 15	0. 0635	
	5 30	0. 0575	
	5 45	0. 0532	
	6 00	0. 0525	
	6 15	0. 0392	
	6 30	0. 0223	
	6 45	0. 0000	Low water of lunar spring tide.

NOTE.—Each co-ordinate is here derived from a mean of 26 observations of the tide-gauge.

Here, in figure 6, we have a curve for the spring tidal wave, derived from the 26 spring tides last enumerated, of greater regularity in its character than that derived from the 24 spring tides previously enumerated and shown in figure 5 and we still have two hundred and fifty-three thousandths (.253) of a foot for the height of the spring tidal wave at its summit.

From a further discussion of the spring tides embraced in the accompanying table H 5, we find that by including two spring tides at the new moon of June 1, instead of one, as was the case in the last preceding enumeration, thus giving us the series contained in the accompanying table H 11, which embraces twenty-seven (27) spring tides, we obtain a still further elimination of the discrepancies in the curve representing the spring tidal wave, caused by extraneous disturbing forces. This last result is shown in the following table H 12, giving the co-ordinates of altitude of the lake surface, and also in the drawing marked figure 7, as follows, viz:

TABLE H 12.—*Showing the quarter-hourly co-ordinates of altitude of the average semi-diurnal lunar spring tidal wave at Chicago, on Lake Michigan, as derived from* 1,377 *observations made at and near the several periods of new and full moon between January* 3 *and June* 30, 1859.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
Before the moon's meridian passage.	5 55	0. 0000	Low water of lunar spring tide.
	5 45	0. 0024	
	5 30	0. 0090	
	5 15	0. 0135	
	5 00	0. 0242	
	4 45	0. 0264	
	4 30	0. 0332	
	4 15	0. 0538	
	4 00	0. 0725	
	3 45	0. 0738	
	3 30	0. 0852	
	3 15	0. 0865	
	3 00	0. 1027	
	2 45	0. 1260	
	2 30	0. 1393	
	2 15	0. 1486	
	2 00	0. 1558	
	1 45	0. 1679	
	1 30	0. 1720	
	1 15	0. 1785	
	1 00	0. 1925	
	0 45	0. 2052	
	0 30	0. 2211	
	0 15	0. 2279	
Moon in the meridian	0 00	0. 2316	
After the moon's meridian passage	0 15	0. 2453	
	0 30	0. 2456	High water of lunar spring tide.
	0 45	0. 2389	
	1 00	0. 2224	
	1 15	0. 2160	
	1 30	0. 2110	
	1 45	0. 2075	

TABLE H 12—Continued.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
After the moon's meridian passage.	2 00	0.1928	
	2 15	0.1723	
	2 30	0.1518	
	2 45	0.1432	
	3 00	0.1290	
	3 15	0.1229	
	3 30	0.1096	
	3 45	0.1005	
	4 00	0.0813	
	4 15	0.0699	
	4 30	0.0650	
	4 45	0.0649	
	5 00	0.0611	
	5 15	0.0586	
	5 30	0.0538	
	5 45	0.0511	
	6 00	0.0507	
	6 15	0.0381	
	6 30	0.0222	
	6 45	0.0000	Low water of lunar spring tide.

NOTE.—Each co-ordinate is here derived from a mean of 27 observations of the tide-gauge.

Here, in figure 7, we have a curve representing the spring tidal wave, derived from the twenty-seven (27) tides just enumerated, still more regular in its character than either of the others previously exhibited.

In all three of these discussions we have, as was originally announced, half an hour after the time of the moon's meridian passage as the time of high water at spring tides—that is to say, at the full and change of the moon—and we have, sensibly, one-fourth of a foot as the elevation of the summit of the tidal wave at those periods; thus verifying the *establishment* for the port of Chicago as at first given, namely, ¼ foot, 0*h.* 30*m.*

These revised results are the more satisfactory as they have been derived from the whole series of nine thousand one hundred and eighty-four (9,184) observations on the tide-gauge, which are recorded in the table A 11 of the report of 1860. None have been rejected in obtaining this new or revised result.

A continued investigation of the aforesaid original observations, the revised results of which are given in the table H 5 of our present report, enables us now to present this curve, and the co-ordinates from which it is derived, representing, by a close approximation, at least, the neap tidal wave in Lake Michigan, or that which occurs at the periods of the first and third (1st and 3d) quarters of the moon.

The accompanying table H 13 contains twenty-eight (28) of these tides, selected from table H 5, which occurred at and very near those periods. The coordinates of altitude of the lake surface, for every half hour, both before and after the time of the moon's meridian transit, derived from a mean of these twenty-eight neap tides, and based on seven hundred ane fifty-six (756) observations of the tide-gauge, are shown at the foot of the table H 13, and, for more convenient reference, they are transferred into the accompanying table H 14.

These tides occurred at the following periods, viz:

1859.	At the first quarter of January 12	3 tides.
	At the third quarter of January 25	3 tides.
	At the first quarter of February 10	3 tides.
	At the third quarter of February 24 (too stormy)	none.
	At the first quarter of March 11	3 tides.
	At the third quarter of March 25	1 tide.
	At the first quarter of April 10, civil account, (lake surface agitated by frequent changes of currents arising from barometric disturbances)	none
	At the third quarter of April 24.	3 tides.
	At the first quarter of May 9	3 tides.
	At the third quarter of May 24	3 tides.
	Near the first quarter of June 7	3 tides.
	At the third quarter of June 23	3 tides.
	Total number of semi-diurnal neap tides above given	28

The mean result derived from these twenty-eight (28) neap tides, as shown by the footing of table H 13, gives the following times and co-ordinates of altitude from which is projected the curve representing the neap tidal wave given in the drawing marked figure 8.

TABLE H 14.—*Showing the half-hourly (and in four places the quarter-hourly) co-ordinates of altitude of the average semi-diurnal neap tidal wave at Chicago, on Lake Michigan, as derived from* 756 *observations made at the first and third quarters of the moon, between January* 11 *and June* 24, 1859.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
Before the moon's meridian passage.	5 00	0.0000	Low water of lunar neap tide.
	4 30	0.0091	
	4 00	0.0336	
	3 30	0.0581	
	3 00	0.0651	
	2 30	0.0922	
	2 00	0.0841	
	1 30	0.1015	
	1 00	0.1111	
	0 30	0.1162	
Moon in the meridian	0 00	0.1093	
After the moon's meridian passage.	0 30	0.1106	
	0 45	0.1164	High water of lunar neap tide.
	1 00	0.1139	
	1 15	0.1086	
	1 30	0.1041	

TABLE H 14—Continued.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
After the moon's meridian passage.	2 00	0. 0835	
	2 30	0. 0683	
	3 00	0. 0541	
	3 30	0. 0384	
	4 00	0. 0208	
	4 30	0. 0406	
	5 00	0. 0371	
	5 30	0. 0303	
	6 00	0. 0217	
	6 30	0. 0137	
	7 00	0. 0065	
	7 30	0. 0000	Low water of lunar neap tide.

NOTE.—Each co-ordinate of altitude is derived from a mean of 28 observations of the tide-gauge, and is expressed in decimals (ten thousandths) of a foot.

Here, in figure 8, the neap tidal wave is well characterized, although there are irregularities in it which would no doubt have been eliminated, or at least much diminished, if the observations of the tide-gauge had been made at intervals of fifteen (15) minutes of time, instead of half an hour apart.

We have one hundred and sixteen thousandths (.116) of a foot as the height of the neap tidal wave at its summit, and forty-five (45) minutes after the moon's meridian passage as the time of high water at lunar neap tides. These are the results of the whole 756 observations recorded in table H 13.

If, however, we reject the seven (7) observations which are underscored in that table, to be printed in bold-faced type, the remaining seven hundred and forty-nine (749) observations will give the following times and co-ordinates of altitude from which the neap tidal wave is projected, as shown in figure 9.

TABLE H 15.—*Showing the half-hourly (and in four places quarter-hourly) co-ordinates of altitude of the average semi-diurnal neap tidal wave at Chicago, on Lake Michigan, as derived from* 749 *observations made at the first and third quarters of the moon, between January* 11 *and June* 24, 1859.

	Mean solar intervals of time before or after the moon's meridian passage.	Observed elevation of the lake surface in decimals of a foot.	Remarks.
	h. m.	*Feet.*	
Before the moon's meridian passage.	5 00	0. 0000	Low water of lunar neap tide.
	4 30	0. 0091	
	4 00	0. 0336	
	3 30	0. 0581	
	3 00	0. 0651	
	2 30	0. 0662	
	2 00	0. 0841	
	1 30	0. 1015	
	1 00	0. 1111	
	0 30	0. 1162	
Moon in the meridian	0 00	0. 1093	
After the moon's meridian passage.	0 30	0. 1106	
	0 45	0. 1164	High water of lunar neap tide.
	1 00	0. 1139	
	1 15	0. 1086	
	1 30	0. 1041	
	2 00	0. 0835	
	2 30	0. 0683	
	3 00	0. 0541	
	3 30	0. 0471	
	4 00	0. 0426	
	4 30	0. 0406	
	5 00	0. 0371	
	5 30	0. 0303	
	6 00	0. 0217	
	6 30	0. 0137	
	7 00	0. 0065	
	7 30	0. 0000	Low water of lunar neap tide.

NOTE.—Each co-ordinate is here derived from a mean of 28 observations of the tide-gauge, except in three cases, in one of which there were 27 observations, and in each of the other two 25 observations.

Figure 9 shows a more regular curve, representing the neap tidal wave, produced by rejecting from table H 13 the seven observations indicated, than is shown in figure 8. It will be reasonable to adopt, for the neap tidal wave, the curve shown by figure 9, in which, and in its corresponding table H 15, we still have one hundred and sixteen thousandths (.116) of a foot as the height of the neap tidal wave at its summit, and forty-five (45) minutes after the time of the moon's meridian passage as the time of high water of neap tides. This is fifteen minutes later than the time of the high water at spring tides, and also of that of the average of all the tides, as previously given. This slight discrepancy of time may, however, be due to the very small differences in the versed sines of the arc, or curve, near its summit; and had the observations been here made at fifteen minutes of time apart, instead of half an hour, perhaps this discrepancy would have disappeared.

Having now developed the characters of the tidal waves in Lake Michigan, at Chicago, appertaining to the neap tides, to the average of all the tides during six months, and to the spring tides, sufficient data are thereby furnished for deducing the lunar and solar tide waves in that lake, each separately, for that station. This will be a subject for further discussion. Special duties to which I have lately been assigned, in addition to my ordinary ones, have prevented the completion of the subject in this report.

We will remark, that in the course of the long series of observations given in table 11 of the report of 1860, it was satisfactorily ascertained that, even during the prevalence of strong winds, which press the waters from one quarter of the lake to another, thus causing a positive local increase of elevation to leeward, and a corresponding local depression to windward, the lunar influence was still shown, by the observations, in adding to, or subtracting from, the elevation of the surface of the water thus impacted or displaced, according as the moon was approaching to, or receding from, the meridian.

For such minute measurements, however, a very delicate tide-gauge is requisite. Such an one is obtained by permanently fixing the long wooden box, within which the float attached to the lower end of the gauge-rod plays, in water not less than ten feet deep. Thus situated, the water is admitted into the box by a single hole not more than three-eighths or one-half ($\frac{3}{8}$ or $\frac{1}{2}$) of an inch in diameter placed five or six inches above the soil at bottom, on which the lower end of the box is made to rest. Even so small an aperture as this is quite sufficient to allow the water within the box to rise and fall simultaneously with, or at least within one or two seconds of the time of, its rise or fall outside of the box. With such an aperture in the box at the depth indicated, the rise and fall of the mere surface or wind waves will scarcely affect or sensibly agitate the gauge-float. It is only the absolute rise or fall of the whole water prism, which immediately surrounds the gauge, that will affect it.

Care should be taken to prevent the small orifice at the bottom of the box from being stopped up by the accumulation of ooze or slimy matter about it. If a pad, composed of straw or rags stuffed into a sack, and made to fit snugly the interior of the box, be pressed down and up the whole length of the box, every day, or once in two or three days, according to circumstances, it will effectually keep the orifice open.

Before doing this, however, the gauge rod with its float must be removed, and then put back as soon as the operation is completed.

If the tide to be measured were one rising many feet in height, it might then be proper to increase the hole near the bottom of the box to double the size above indicated.

The meteorological observations have been continued as usual. They are herewith presented in the tables marked K, L, M, N, O.

Assistant John M. Bigelow's very interesting Meteorological report is hereto attached, marked I.

MONTHLY METEOROLOGICAL REGISTERS AT THE FOURTEEN STATIONS.

In the first column of each of these tables is recorded the date. In the second, third and fourth columns the readings of the barometer, reduced to the temperature of 32° Fahrenheit, are recorded for each of the observations at 7 a. m., 2 p. m. and 9 p. m. The fifth column contains the means of the three daily observations. From the sixth to the eighth columns inclusive, the readings of the wet-bulb thermometer, or the temperature produced by the evaporation of water, and recorded at each of the hours of observation. In the ninth, tenth and eleventh columns, the temperature of the open air, screened from the reflected rays of the sun, is given. In the twelfth column is given the means of the three daily observations of the temperature of the air. In the thirteenth and fourteenth columns are recorded the maximum and minimum of the day. The next four columns give the 7 a. m. 2 p. m. and 9 p. m., observations, and the daily means of the elastic force of vapor. The 19th to the 22d columns, inclusive, give the measures of relative humidity at the three observations, and the daily means. The 23d to the 25th columns, inclusive, give the direction from whence the wind blow, and the three succeeding columns give the velocity of the winds, in miles per hour, for each of the times of observation. The 29th column gives the resultant velocity, and the 30th the resultant direction of the winds, daily. The three succeeding columns give the amount of cloudiness for each hour of observation. The 34th column gives the daily amount of evaporation in decimals of an inch. In the 35th column the amount of rain and melted snow is recorded as near the time of precipitation as could be approximated. The last column is left open for remarks.

Without materially increasing the size of the monthly tables, it is believed that the addition of the records for each hour would add very much to the interest of those who wish to consult them. By comparing the simultaneous records of the different stations the changes of all the meteorological phenomena, which begin in a great majority of cases in the west, and progressively advance towards the east, can be much better exemplified by these tables than those where only a daily mean of the records are given. The wave of barometric pressure from Superior City to Sackett's Harbor can be distinctly traced by these registers.

As an illustration, we append a few instances in each month of the last year. A wave of high atmospheric pressure occurs from the 15th to the 17th of August, 1862. The barometer attains its maximum at 7 a. m. of the 15th at Superior City, at 2 p. m. of the 16th at Thunder bay, and 7 a. m. of the 17th at Sackett's Harbor. A wave of low pressure occurs on the 22d, the lowest point of the barometer being found at 7 a. m. of the 22d at Thunder bay, and 9 a. m. of the same day at Sackett's Harbor. At another high wave of pressure on the 23d and 24th the maximum was reached at 2 p. m. of the 23d at Superior City, and at 7 a. m. of the 24th at Sackett's Harbor. In September, a wave of low pressure shows the minimum at 7 a. m. at Superior City, at 9 p. m. at Thunder bay, and at 2 p. m. of the 8th at Sackett's Harbor. A high wave of the 8th shows the culmination of the barometer at 9 p. m. at Superior City, at 7 a. m. of the 9th at Thunder bay, and at 2 p. m. of the same day at Sackett's Harbor.

A minimum wave of the 11th shows the lowest barometer at 7 a. m. of the 11th at Superior City, at 9 p. m. at Thunder bay, and at 7 a. m. of the 12th at Charlotte. Another low wave is exhibited on the 17th and 18th, the minimum being at 2 p. m. of the 17th at Superior City, at 7 a. m. of the 18th at Thunder bay, and at 2 p. m. of the same day at Sackett's Harbor. On the 3d and 4th of October a wave of low pressure occurs, the minimum at Superior City being at 9 p. m. of the 3d, at Thunder bay at 7 a. m. of the 4th, and at 9 p. m. of the same day at Sackett's Harbor. In the succeeding wave of high barometer the maximum is attained at 9 p. m. of the 4th at Superior City, at 7 a. m. of the 5th at Thunder bay, and 9 p. m. of the same day at Sackett's Harbor. In another wave of low pressure the minimum is reached at 2 p. m. of the 20th at Superior City, at 2 p. m. of the 21st at Thunder bay, and 7 a. m. of the 22d at Sackett's Harbor. On the 11th of November a wave of low pressure occurred. The minimum was at 7 a. m. at Superior City, at 2 p. m. at Thunder bay, and at 9 p. m. at Sackett's Harbor. A wave of high pressure began at Superior City the maximum of which was attained at 7 a. m. of the 15th; at Thunder bay it was reached at 2 p., m. and at Sackett's Harbor at 7 a. m., of the 16th. Another low wave occurs on the 19th and 20th, the minimum being at 2 p. m. of the 19th at Superior City, at 7 a. m. of the 20th at Thunder bay, and at 2 p. m. of the same day at Sackett's Harbor. Another high wave has the maximum at 9 p. m. of the 22d at Superior City, at 7 a. m. of the 23d at Thunder bay, and 7 a. m. of the 24th at Sackett's Harbor. On the 12th of December a wave of high pressure began at Superior City, the maximum being at 9 p. m. At Thunder bay it is at 7 a. m. of the 13th, and at Charlotte it is at 9 p. m. of the same day

A minimum wave began at Superior City at 7 a. m. of the 18th, the minimum being reached at 9 p. m. of the same day at Thunder bay, and 7 a. m. of the 19th at Sackett's Harbor. On the 19th the succeeding high pressure has the maximum at 2 p. m. at Superior City, at 7 a. m. of the 20th at Thunder bay, and at 2 p. m. of the same day at Sackett's Harbor. Another minimum wave in this month has the minimum at 7 a. m. of the 22d at Superior City, at 2 p. m. at Thunder bay, and at 9 p. m. of the same day at Sackett's Harbor. In January, 1863, a wave of low pressure occurs, beginning at Superior City, the minimum occurring there at 9 p. m. of the 13th, at Thunder bay at 2 p. m. of the 14th, and at Sackett's Harbor at 9 p. m. of the same day. The succeeding maximum wave has the maximum at Superior City at 9 p m. of the 15th, at Thunder bay at 9 p. m. of the 17th, and at Sackett's Habor at 7 a. m. of the 18th. On the 1st of February, 1863, a wave of low pressure occurs, the minimum being at 7 a. m. at Superior City, at 2 p. m. at Thunder bay, and at 9 p. m. at Sackett's Harbor. The succeeding wave of high pressure gives the maximum at 7 a. m. of the 3d at Superior City, at 2 p. m. of the 4th at Thunder bay, and at 9 p. m. at Sackett's Harbor. A high wave began at Superior City in March, the maximum being at 7 a. m. of the 4th, at Thunder bay at 2 p. m. of the same day, and at Sackett's Harbor at 7 a. m. of the 5th. A low pressure began at Superior City, the minimum being there at 9 p. m. of the 16th, at 7 a. m. of the 17th at Thunder bay, and 2 p. m. of the same day at Sackett's Harbor. In April a low pressure wave occurs, the minimum at Superior City being at 2 p. m. of the 10th, at Thunder bay at 7 a. m. of the 11th, and at Sackett's Harbor at 9 p. m. of the same day. A wave of high pressure takes place on the 20th and 21st, attaining the maximum at 9 p. m. of the 20th at Superior City, at 7 a. m. of the 21st at Thunder bay, and at 2 p. m. of the same day at Sackett's Harbor. In May a minimum wave began at Superior City at 2 p. m. of the 15th. The minimum at Thunder bay was at 7 a. m. of the 16th, and at Sackett's Harbor at 9 p. m. of the same day. In a succeeding high wave the maximum at Superior City was at 7 a. m. of the 27th, at Thunder bay at 2 p. m. of the same day, and at Sackett's Harbor at 7 a. m. of the 28th.

The changes of temperature from west to east can be traced in the same manner, by a reference to the tables for each station.

Respectfully submitted.

J. D. GRAHAM,
Colonel of Engineers, Sup't of the Survey of the N. and N. Lakes.

Brigadier General J. G. TOTTEN,
Chief Engineer, Washington.

A.

Instructions for determining differences of longitude by the aid of signals produced by flashing small charges of gunpowder at night.

OFFICE OF THE UNITED STATES LAKE SURVEY,
Detroit, June 11, 1863.

The astronomical party will this year be divided into two sections, which are to co-operate. The first section will be under the direction of Mr. James Carr, with Mr. O. B. Wheeler as assistant, and Mr. William Le Baron as recorder. The second section will be under the direction of Mr. E. P. Austin, with Mr. William Mendenhall as assistant.

General instructions, necessary to carry out this programme, will, in the absence of the superintendent, be given to both sections by Mr. Carr.

The first duty to be performed by this party, in the field, will be to connect, in longitude, the stations whose latitudes were determined from observation last year, and also with them such other stations as may be conveniently included whose latitudes have been determined during any previous period of the survey of the N. and N. W. lakes. This will be done by comparing the local time, determined by observation, at any two of such stations, the one to be occupied by Mr. Carr's section, and the other by Mr. Austin's. If the two stations in question were connected by a line of telegraphic wires, the usual electric signals transmitted along those wires would be used. But there are no such conveniences within the field of our present work.

The comparison of time at the two stations will, therefore, be made by chronometer records of signals at night, to be produced by flashing small charges of gunpowder from heights previously ascertained, to be visible from both of said stations. A small charge of gunpowder, say two or three ounces, poured out of a flask upon any flat surface, as a plate of iron, or into a common frying-pan, and ignited, will give a brilliant instantaneous flash, visible to the naked eye, through a clear atmosphere, at a distance of sixty miles. No doubt heights may be found from which these signals may be made at a much less distance from the observers.

For a nice determination of difference of longitude it is desirable that the mean period of the flashes should correspond very nearly with the mean period of the time observations for each night. This may be effected by having two series of time observations, the one to be made before and the other after the flashes, the axis of the transit to be reversed between the two series in order to eliminate any error in collimation of the wires.

The deviation, in azimuth, from the true meridian, should be determined separately for each of the two nightly series; or intermissions in the flashing may be arranged to allow of important time stars being observed, and then the flashing be resumed. An intermission of three to five minutes on such an occasion would be sufficient, as the assistant to each station could have the transit telescope set beforehand, for the observation. It is important that the person who observes for the time should also observe and note or indicate the times of the flashes. This will prevent a complication in deducing any allowance for personal equation.

The flashing should be at intervals of one minute of time apart, and one hour should be devoted to it on each night until one hundred of these signals be observed simultaneously at each of the stations without changing the observer at either station. Besides these, I desire that thirty results be obtained for each pair of stations, from observations both for determining the time and the flashes, by the assistants. This will give them a degree of practice that will render their services more valuable another season.

A full catalogue should be made, in duplicate, of all stars to be observed for determining the time between the beginning and the end of the season. These should be referred to at all the stations, and there should be a mutual understanding, so that the same stars may, as far as possible, be observed at both the stations occupied on the same night.

This will eliminate any small errors due to imperfect determinations of the right ascensions of the stars.

When the first result for difference of longitude shall have been determined, the party which occupied station No. 1 will pass beyond that occupying station No. 2, and establish itself at station No. 3, where it will co-operate with No. 2 to get the difference of longitude between these two stations. When this shall have been done, the party at station No. 2 will pass beyond that at No. 3 and *establish itself* at station No. 4, where it will co-operate with No. 3 in getting the difference of longitude between Nos. 3 and 4, and so on. By this mode of advancing there will be an elimination of the personal equation both as regards the observers and the instruments, for every advance except for the first space, in regard to which it may be well for the observers to go through a second operation by each occupying the other's station. But the transit instruments need not be changed, as they are similar in all respects and made by the same maker. Or, for the first space the personal equation of the observers, as already established by numerous observations made at the Lake Survey observatory for that purpose, may be applied.

After reaching, by this system, the station of last year near Pottawatomie light-house, on Rock island, at the mouth of Green bay, the connexions may be extended to one of the Manitou or one of the Fox islands, and also to High island or Beaver island, and to Mackinac.

It is also very desirable, if it be possible, to get a station across the country on the coast of Lake Superior. A careful reconnoissance of the physical character of the country must determine if these steps be feasible.

When new points are determined in longitude, their latitudes should also be determined, if not already done, but the progress of the other operation need not be immediately arrested for this purpose.

The connexion of the Green bay (Fort Howard) astronomical station of last year will, at a convenient period hereafter, be made by electro-telegraphic communication with a well-established meridian.

A light and portable camp and mess equipment will be provided by Assistant Carr, sufficient for two flashing parties, one of which will be employed in reconnoitring for good and commanding flashing stations for advancing the work, whilst the observations are going on with the aid of such a station already occupied.

J. D. GRAHAM,
Colonel of Engineers, Superintendent, &c.

B.

Assistant D. F. Henry's report on the survey of the St. Clair flats channel, in May, 1863.

UNITED STATES LAKE SURVEY OFFICE,
Detroit, June 9, 1863.

SIR: I have the honor to submit the following report of work done at the St. Clair flats improvement, by the party under my charge, on the U. S. steamer Search, during the latter part of the past month:

Theodolite pointings	227
Angles of triangulation, (repeated)	6
Triangulation stations built and repaired	3
Buoys placed and located	32
Spar buoys located	7
Sextant angles read	77
Casts of the sounding-rod and lead	4,371
Lines of sounding run	200
Miles of lines of sounding	61½
Hydrography	⅝ sq. mile.
Readings of water-gauges	199

I found the water level was 0.5235 foot below the level of June, 1861, and 1.0585 foot above the level of October, 1856.

The mean depth in the line of the range of the beacon and light-house was 13.29 feet, showing a washing away, since June, 1861, of 0.32 foot. By comparison of the water-gauge records at "The Bush" and at the light-house, I find that the index of the water-gauge I established this year, by your direction, at the light-house, is above the new stone bench-mark established, in 1860, at "The Bush," 9.246 feet.

The stage of water during the different years since the first survey in 1856 is shown by the following table, which shows the relative level of the water surface, and the mean depth on the line of the range of the beacon and light-house in the cut for the year 1856, '58, '59, '60, and '63.

Date of survey.	Computed readings of the water surface by three tide-gauges at the light-house established May, 1863.	Level of water below B. M. at "The Bush."	Mean depth in channel way or cut.	Mean depth of channel way, below B. M. at "The Bush."	Change of bottom: + filling up; — washing away.	Remarks.
	Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	
September, 1856	0.784	4.81	8.70	13.51		
September, 1858	2.474	3.12	14.20	17.32	—3.81	
April, 1859	2.484	3.11	13.70	16.81	+0.51	
April, 1860	1.994	3.60	13.20	16.80	+0.01	Dredging.
June, 1861	2.394	3.20	12.50	16.70	+0.10	
May, 1863	1.864	3.73	13.29	17.02	—0.32	

It will be noticed that the water rose from 1856 to 1859, and that it has been slowly falling since the last-mentioned date. The apparent rise in 1861 is accounted for by the survey having been made two months later that year than in 1860, the annual wave being at its maximum in July or August, and its minimum in February. In a report to Captain Meade, T. E., superintendent, &c., on the oscillations of the lakes, I made the annual wave on Lake Huron nearly two feet, and the great fluctuation extending through a number (at least twenty) of years to be upwards of four feet.

By the table accompanying this report the mean amount of dredging along the centre line of the cut, or rather of the line of the range of the beacon and light-house, was 3.81 feet, and that during the next year the filling of the bottom by the natural action of the water make it 0.51 foot less. During the next two years it filled up only 0.11 foot, and in the last two, from 1861 to 1863, it has washed away 0.32 foot. One spot of only 11 feet depth, and another of 11½, will be seen on this line on the accompanying map. In 1860 I found one lump, of 8¾ feet, nearly on the same line. These lumps and the corresponding depressions are probably caused by the powerful propellers which have been introduced in the past few years. They are often loaded down, so that they touch the bottom almost all the way through the cut, and sometimes will be entirely stopped for a few moments; then the screw excavates the earth underneath itself and heap it up on one side or the other, so that the bottom of the cut, particularly in the fall of the year, will be changed from day to day. The profiles of the fine longitudinal lines show but little change in the sides of the cut until this year. The north bank has caved in in two places, and shoaled the channel there, while the line on the south bank shows a little deepening there. The sides never having been sloped, it is strange that they have stood so long, and particularly so, because of the line of the range of the beacon and light-house not being coincident with the centre of the cut, for if a vessel tries to run on the range it will nearly strike the south bank; and in keeping above the range, they generally allow too much, and so wear away or undermine the north bank.

Unless the screws of the steamers can deepen it, as the general level of the water is depressed, the cut will become too shallow for the passage of the larger class of propellers and sail vessels running on the upper lakes, as they draw, when loaded, from eleven to twelve feet.

If the water should recede to the level of 1856, and the bottom of the cut remain as at present, the least water in the cut would be less than ten feet. But if it should recede to its minimum, the bottom remaining the same, the least water would be only seven and one-half feet in the early summer, and six and one-half in the fall; consequently the cut ought to be deepened at least four feet, to make it useful in the approaching low stage of water.

But as it has deepened itself a third of a foot in the past two years, it is possible that, as the water lowers, the propellers may keep it clear. If dredged again, the sides should be sloped and the centre of the cut made coincident with the range of the beacon and light-house.

Very respectfully, your obedient servant,

D. F. HENRY,
Assistant, Lake Survey.

Lieut. Colonel J. D. GRAHAM,
United States Engineers, Superintendent Lake Survey.

C.—*Return of charts issued at Detroit and Buffalo from October* 1, 1862, *to October* 1, 1863.

Title of chart.	1862.			1863.									Total of each.
	October.	Novemb'r.	Decemb'r.	January.	February.	March.	April.	May.	June.	July.	August.	Septem'r.	
Lake Erie	32	6	....	2	1	7	29	32	23	20	19	19	190
West end of Lake Erie	35	7	....	1	1	7	26	31	27	13	17	19	184
Kelly's and Bass islands	32	7	....	1	1	7	28	30	25	16	16	19	182
Straits of Mackinac	25	6	....	1	1	6	26	30	26	16	16	18	171
East Neebish rapids	13	....	....	1	1	6	21	25	22	8	10	12	119
Head of Green bay	17	5	....	1	1	5	25	26	25	17	11	19	152
St. Clair flats	31	6	....	1	1	6	26	29	27	20	16	18	181
Buffalo harbor	31	6	....	1	1	5	26	30	26	14	16	18	174
Tawas harbor	32	7	....	1	1	7	27	26	25	18	15	19	178
Beaver Group	29	6	....	1	1	6	25	28	26	14	14	19	169
Eagle harbor	19	6	....	1	1	5	21	26	23	5	9	11	127
Agate harbor	17	6	....	1	1	5	21	26	24	12	8	11	132
River St. Marie, No. 1	22	4	....	1	1	6	24	28	24	20	11	12	153
River St. Marie, No. 2	22	2	....	1	1	6	26	27	24	20	10	12	151
Maumee bay	35	2	....	2	1	7	31	37	28	16	17	17	193
Eagle river	19	6	....	1	1	6	28	27	23	12	9	11	143
Ontonagon harbor	26	6	....	1	1	7	30	28	25	13	10	11	158
Saginaw bay	26	10	....	2	1	11	47	42	21	16	20	24	220
Thunder bay	36	10	....	2	1	10	46	43	22	20	19	22	231
Marquette harbor	22	....	....	1	1	8	34	32	27	19	12	14	170
Presque Isle and Middle island	36	9	....	2	1	10	44	42	23	19	19	22	227
Lake Huron	48	15	....	2	1	12	48	23	24	25	25	26	249
South end of Lake Huron	37	12	....	2	1	10	49	39	21	18	18	23	230
Total in each month	642	144	....	30	23	165	708	707	561	371	337	396	4,084

Table showing the annual issue prior to October 1, 1863.

Prior to October 1, 1857	2,500
October 1, 1857, to October 1, 1858	1,675
October 1, 1858, to October 1, 1859	2,600
October 1, 1859, to October 1, 1860	4,890
October 1, 1860, to October 1, 1861	3,254
October 1, 1861, to October 1, 1862	5,245
October 1, 1862, to October 1, 1863	4,084
Total to October 1, 1863	24,248

J. D. GRAHAM, *Colonel of Engineers.*

D.

Estimate for continuing the survey of the north and northwestern lakes for the fiscal year to commence the 1st of July, 1864, *and to end the 30th of June*, 1865.

1. For two hydrographical parties, one on each of the surveying steamers Search and Surveyor. The cost of employing each of these parties will be as follows, viz:

1 assistant, 183 days, at $4 per day	$732 00
1 assistant, 183 days, at $3 per day	549 00
1 assistant, 183 days, at $2 per day	366 00
1 recorder of soundings, 183 days, at $1 per day	183 00
1 sailing master, 183 days, at $2 75	503 25
1 mate, 183 days, at $1 75	320 25
1 steam engineer, 183 days, at $2 50	457 50
1 assistant steam engineer, 183 days, at $1 75	320 25
1 carpenter, 183 days, at $1 75	320 25
1 steward, 183 days, at $1 50	274 50
1 cook, 183 days, at $1 25	228 75
1 second cook, 183 days, at $1	183 00
4 firemen, 183 days, at $1 25 each	915 00
14 seamen, 183 days, at $1 each	2,562 00
Subsistence of the above 30 persons, 183 days, at 50 cents each per day	2,745 00
600 tons of coal, for fuel, at $9 per ton	5,400 00
Total for one hydrographical party	16,059 75
Then, for two hydrographical parties	32,119 50

2. For two triangulation parties. One party will cost as follows, viz:

1 assistant, 183 days, at $4 per day	$732 00
1 assistant, 183 days, at $3 per day	549 00
2 recorders of observations, 183 days, at $1 per day each	366 00
1 sailing master, 183 days, at $2 50	457 50
1 mate, 183 days, at $1 75 per day	320 25
1 second mate, 183 days, at $1 50 per day	274 50
1 carpenter for building stations, 183 days, at $1 75 per day	320 25
1 steward, 183 days, at $1 50 per day	374 50
1 cook, 183 days, at $1 25 per day	228 75
6 seamen, 183 days, at $1 per day each	1,098 00
14 laborers for building stations and cutting outlines, at 90 cents per day each	2,305 80
Subsistence for the above 30 persons, 183 days, at 50 cents per day each	2,745 00
Total for one party on schooner Coquette	9,671 55
The other party will cost the same, with the addition of $2,500 for the charter of a vessel for five months, making the cost of this second party	12,171 55
(2.) Total for two triangulation parties	21,843 10

3. For two astronomical and magnetic parties. Each party will cost as follows, viz:

1 assistant, 183 days, at $4 per day	$732 00
1 assistant, 183 days, at $3 per day	549 00
2 recorders, 183 days, at $1 25 per day each	457 50
1 carpenter for building observatory stations, 183 days, at $1 75.	320 25
1 steward, 183 days, at $1 50 per day	274 50
1 cook, 183 days, at $1 25 per day	228 75
2 signal men for flashing gunpowder, 183 days, at $1 25 each per day	457 50
7 men for boat's crew and laborers, 183 days, at 90 cents each per day	1, 152 90
Subsistence of 16 men, 183 days, at 50 cents each per day	1, 464 00
Expense of moving parties, provisions, and camp equipage	400 00
Total for one party	6, 036 40
(3.) For two astronomical and magnetic parties	12, 072 80

4. For four topographical parties to survey shore-lines, and adjacent topography, and make in-shore soundings, each party will cost as follows:

1 assistant, 183 days, at $4 per day	$732 00
1 assistant, 183 days, at $3 per day	549 00
1 assistant, 183 days, at $2 per day	366 00
1 foreman, 183 days, at $1 50 per day	274 50
1 carpenter, for building stations, 183 days, at $1 75 per day	320 25
1 steward, 183 days, at $1 50 per day	274 50
1 cook, 183 days, at $1 25 per day	228 75
2 leadsmen, 183 days, at $1 each per day	366 00
14 men, for boatmen, axemen, and chain-bearers, at 90 cents each per day, for 183 days	2, 305 80
Subsistence of the above 23 persons, 183 days, at 50 cents each per day	2, 104 50
Purchase of tools, axes, buoys, buoy rope, leads and lines, materials for building stations, and camp and mess equipage	400 00
Expense of moving parties to and in the field, transportation of provisions, &c	300 00
Cost of each topographical party	8, 221 30
(4.) Then, for four topographical parties	32, 885 20

5. OFFICE AND MISCELLANEOUS EXPENSES.

Office rent and fuel for one year	$1, 200 00
Pay of 3 draughtsmen, 1 year, (365 days,) at $4 each per day	4, 380 00
Pay of 1 computer, 365 days, at $4 per day	1, 460 00
Pay of 7 assistants, heads of parties, 182 days, at $4 each per day.	5, 096 00
Pay of 7 assistants, 182 days, at $3 each per day	3, 822 00
Pay of 7 assistants, 182 days, at $2 50 each per day	3, 185 00
Pay of 6 assistants, 182 days, at $2 each per day	2, 184 00
Pay of 1 assistant for meteorological department, 365 days, at $4 per day	1, 460 00

Pay of 1 assistant for meteorological department, 365 days, at $1 50 per day	$547 50
Steamers in ordinary and hire of carpenters	2, 000 00
Commutation for fuel and quarters for one colonel of engineers, superintendent of the lake survey, and his transportation while travelling on duty, for one year	1, 500 00
Expenses in office, for drawing paper, drawing materials, and stationery, purchase of nautical almanacs, &c	600 00
For making meteorological and water-gauge observations, one year.	4, 500 00
Contingent expenses, such as purchase of tents, boats, camp equipage, tools, cordage, blocks, rigging, sails for vessels and boats, paints, oils, paint brushes, brooms, materials for erecting trigonometrical and sounding stations, and for repairs of the steamers, vessels, boats, and instruments, and lights for the office and observers	6, 000 00
	37, 934 50
Total amount of estimate	136, 855 10

The above estimate is based on the increase of prices of labor and materials which have taken place during the past year, and that which is likely to take place during the fiscal year for which the estimate is presented.

J. D. GRAHAM,
Colonel of Engineers.

OFFICE UNITED STATES LAKE SURVEY,
Detroit, October 19, 1863.

E.

Estimate of the cost of building one iron side-wheel steamer for the survey of the north and northwestern lakes, to be used in lieu of the schooner Coquette, now employed for that service.

For the construction of the hull and machinery, with the rigging and necessary furniture, to be of the same dimensions as the survey steamer Search	$60, 000 00

J. D. GRAHAM,
Colonel of Engineers.

OFFICE UNITED STATES LAKE SURVEY,
Detroit, October 19, 1863.

F 1.—*Table showing the monthly mean level and the intermediate rise or fall of each lake from July* 1, 1862, *to June* 30, 1863. + *for rise and* — *for fall.*

The figures indicate the mean quantities below the high water of 1838; those having a star prefixed show the quantity above that level.

		Lake Superior.	Lake George.	Lake Michigan.	Lake Huron.	Lake Erie.	Lake Ontario.
		Feet.	*Feet.*	*Feet.*	*Feet.*	*Feet.*	*Feet.*
1862, July	Mean level	2.34	2.14	1.75	1.45	0.75	0.62
	Rise, +. Fall, —.	+ .17	+ .12	— .01	+ .02	— .35	— .38
August	Mean level	2.17	2.02	1.76	1.43	1.10	1.00
	Rise, +. Fall, —.	+ .12	+ .04	— .01	— .14	— .32	— .50
September	Mean level	2.05	1.98	1.77	1.57	1.42	1.50
	Rise, +. Fall, —.	— .07	+ .02	— .10	+ .15	— .30	— .45
October	Mean level	2.12	1.96	1.87	1.42	1.72	1.95
	Rise, +. Fall, —.	— .33	— .52	— .16	— .35	— .24	— .42
November	Mean level	2.45	2.48	2.03	1.77	1.96	2.37
	Rise, +. Fall, —.	— .27	G'e frozen	— .13	— .27	— .11	— .15
December	Mean level	2.72	... do....	2.16	2.04	2.07	2.52
	Rise, +. Fall, —.	— .19	... do....	— .33	— .12	+ .42	+ .03
1863, January	Mean level	2.91	... do....	2.49	2.16	1.65	2.49
	Rise, +. Fall, —.	— .13	... do....	— .02	— .29	+ .29	+ .00
February	Mean level	3.04	... do....	2.51	2.45	1.36	2.40
	Rise, +. Fall, —.	— .17	... do....	+ .10	— .05	— .06	+ .08
March	Mean level	3.21	... do....	2.41	2.50	1.42	2.32
	Rise, +. Fall, —.	+ .04	... do....	— .04	+ .14	+ .22	+ .51
April	Mean level	3.17	2.94	2.45	2.36	1.20	1.81
	Rise, +. Fall, —.	+ .13	+ .13	+ .26	+ .35	— .10	+ .69
May	Mean level	3.04	2.81	2.19	2.01	1.30	1.12
	Rise, +. Fall, —.	— .08	+ .10	+ .02	+ .14	— .01	+ .11
June	Mean level	3.12	2.71	2.17	1.87	1.31	1.01

F 2.—*Table showing the maxima, minima, and mean elevation of the surfaces of all the lakes as affected by all causes, such as tributary supply, discharge, water shed, evaporation, and force of winds, at each of the stations for every month from July* 1, 1862, *to June* 30, 1863.

The figures indicate the mean quantities below the high water of 1838; those having a star prefixed show the quantity above that level.

			Lake Superior; Superior City.	Sugar Island, Lk. George.	LAKE MICHIGAN.		LAKE HURON.		LAKE ERIE.			LAKE ONTARIO.	
					Milwaukie.	Grand Haven.	Thunder Bay isl'd.	Point aux Barques.	Cleveland.	Erie.	Buffalo.	Fort Niagara.	Charlotte.
1862, July	Monthly means		2.34	2.14	1.82	1.69	1.33	1.57	0.72	0.80	0.73	0.68	0.56
	Daily record	Maximum	1.93	1.89	1.37	0.70	1.11	1.42	0.18	0.50	*0.03	0.44	0.43
		Minimum	2.58	2.39	2.13	1.95	1.53	1.82	1.33	1.30	1.57	0.89	0.68
		Range	0.65	0.50	0.76	1.25	0.42	0.40	1.15	0.80	1.60	0.45	0.25
	Ten-day means	Maximum	2.29	2.09	1.75	1.65	1.27	1.54	0.65	0.74	0.59	0.55	0.53
		Minimum	2.39	2.17	1.86	1.73	1.37	1.60	0.90	0.89	0.84	0.89	0.59
		Range	0.10	0.08	0.11	0.08	0.10	0.06	0.25	0.15	0.25	0.34	0.08
August	Monthly means		2.17	2.02	1.81	1.71	1.28	1.59	1.10	1.18	1.03	1.12	0.89
	Daily record	Maximum	1.93	1.69	0.83	0.75	1.01	1.24	0.78	0.60	*0.03	0.84	0.56
		Minimum	2.63	2.29	1.98	1.98	1.52	1.91	1.48	1.60	1.47	1.44	1.18
		Range	0.70	0.60	1.15	1.23	0.51	0.67	0.70	1.00	1.50	0.60	0.62
	Ten-day means	Maximum	2.13	1.97	1.80	1.63	1.20	1.52	0.94	0.99	0.84	0.96	0.68
		Minimum	2.23	2.07	1.82	1.85	1.34	1.68	1.28	1.37	1.24	1.40	1.16
		Range	0.10	0.10	0.02	0.22	0.14	0.16	0.34	0.38	0.40	0.44	0.48
September	Monthly means		2.05	1.98	1.77	1.78	1.34	1.81	1.41	1.57	1.28	1.58	1.42
	Daily record	Maximum	1.58	1.69	1.31	1.45	1.03	1.12	0.68	0.90	*0.33	1.39	1.11
		Minimum	2.73	2.29	2.19	2.20	1.55	2.19	1.68	2.65	2.22	1.79	1.71
		Range	1.15	0.60	0.88	0.75	0.52	1.07	1.00	1.75	2.55	0.40	0.60
	Ten-day means	Maximum	1.98	1.91	1.65	1.72	1.31	1.67	1.32	1.42	1.11	1.46	1.21
		Minimum	2.16	2.04	1.86	1.83	1.38	1.89	1.54	1.67	1.46	1.79	1.70
		Range	0.18	0.13	0.21	0.11	0.07	0.22	0.22	0.25	0.35	0.33	0.49
October	Monthly means		2.12	1.96	1.97	1.78	1.31	1.53	1.79	1.78	1.60	1.99	1.92
	Daily record	Maximum	1.68	1.49	1.64	0.85	0.96	0.70	1.23	0.70	0.17	1.79	1.51
		Minimum	2.83	2.59	2.47	2.30	1.68	2.02	2.38	2.60	2.87	2.34	2.23
		Range	1.15	1.10	0.83	1.45	0.72	1.32	1.15	1.90	2.70	0.55	0.72
	Ten-day means	Maximum	2.04	1.84	1.86	1.69	1.22	1.43	1.58	1.67	1.25	1.82	1.75
		Minimum	2.25	2.26	2.09	1.87	1.53	1.69	2.15	2.02	1.86	2.31	2.11
		Range	0.21	0.42	0.23	0.18	0.31	0.26	0.57	0.35	0.61	0.49	0.36

F 2.—*Table showing the maxima, minima, and mean elevation of the surfaces of all the lakes, &c.*—Continued.

					LAKE MICHIGAN.		LAKE HURON.		LAKE ERIE.			LAKE ONTARIO.	
			Lake Superior; Superior City.	Sugar island, Lk. George.	Milwaukie.	Grand Haven.	Thunder Bay Isl'd.	Point aux Barques.	Cleveland.	Erie.	Buffalo.	Fort Niagara.	Charlotte.
1862, November	Monthly means		2.45	2.48	2.15	1.92	1.70	1.85	2.13	2.05	1.71	2.46	2.29
	Daily record	Maximum	1.88	1.99	1.64	1.50	1.39	1.44	1.58	1.40	1.07	2.29	2.01
		Minimum	2.68	2.79	2.94	2.35	1.93	2.17	2.48	2.60	3.17	2.69	2.61
		Range	0.80	0.80	1.30	0.85	0.54	0.73	0.90	1.20	2.10	0.40	0.60
	Ten-day means	Maximum	2.29	2.34	2.04	1.81	1.61	1.71	1.92	1.97	1.82	2.33	2.15
		Minimum	2.65	2.61	2.25	2.04	1.82	2.00	2.34	2.14	1.88	2.61	2.40
		Range	0.36	0.27	0.21	0.23	0.21	0.29	0.42	0.17	0.06	0.28	0.25
December	Monthly means		2.72	Gauge frozen.	2.09	2.23	1.94	2.14	2.10	2.03	Gauge frozen.	2.62	2.43
	Daily record	Maximum	1.98		1.55	1.90	1.51	1.35	1.53	0.85		2.54	2.23
		Minimum	3.18	do	2.60	2.50	2.31	2.69	2.63	2.55	do	2.69	2.66
		Range	1.20	do	1.05	0.60	0.80	1.34	1.10	1.70	do	0.15	0.43
	Ten-day means	Maximum	2.54	do	2.02	2.11	1.85	2.00	1.96	1.95	do	2.56	2.41
		Minimum	2.88	do	2.35	2.36	2.05	2.29	2.20	2.13	do	2.66	2.49
		Range	0.34	do	0.33	0.25	0.20	0.29	0.24	0.18	do	0.10	0.08
1863, January	Monthly means		2.91	do	2.59	2.39	2.02	2.30	1.65	Gauge frozen.	do	2.62	2.36
	Daily record	Maximum	2.35	do	1.89	1.80	1.67	1.76	1.13		do	2.59	1.96
		Minimum	3.28	do	3.07	2.80	2.23	2.92	2.13	do	do	2.69	2.58
		Range	0.93	do	1.18	1.00	0.56	1.16	1.00	do	do	0.10	0.62
	Ten-day means	Maximum	2.82	do	2.52	Gauge frozen.	Gauge frozen.	2.22	1.40	do	do	2.58	2.26
		Minimum	3.03	do	2.68			2.37	1.89	do	do	2.66	2.44
		Range	0.21	do	0.16	do	do	0.15	0.49	do	do	0.08	0.18
February	Monthly means		3.04	do	2.51	do	do	2.45	1.36	do	do	2.63	2.17
	Daily record	Maximum	2.15	do	2.15	do	do	1.64	0.93	do	do	2.54	1.88
		Minimum	3.58	do	3.00	do	do	2.87	1.63	do	do	2.69	2.48
		Range	1.43	do	0.85	do	do	1.23	0.70	do	do	0.15	0.60
	Ten-day means	Maximum	2.99	do	2.46	do	do	2.43	1.30	do	do	2.60	2.07
		Minimum	3.09	do	2.59	do	do	2.53	1.45	do	do	2.66	2.23
		Range	0.10	do	0.13	do	do	0.10	0.15	do	do	0.06	0.16
March	Monthly means		3.21	do	2.52	2.31	do	2.50	1.42	do	do	2.64	2.00
	Daily record	Maximum	2.73	do	2.20	1.50	do	2.19	1.08	do	do	2.54	1.76
		Minimum	3.58	do	3.00	2.75	do	3.02	1.78	do	do	2.69	2.21
		Range	0.85	do	0.80	1.25	do	0.83	0.70	do	do	0.15	0.45

	Ten-day means	Maximum	3.12	do	2.34	2.90	do	2.41	1.36	do	do	2.56	1.79
		Minimum	3.36	do	2.66	2.43	do	2.66	1.49	do	do	2.66	2.08
		Range	0.24	do	0.32	0.23	do	0.25	0.13	do	do	0.11	0.29
April	Monthly means		3.17	2.94	2.57	2.33	2.30	2.43	1.30	1.11	do	2.22	1.41
	Daily record	Maximum	2.40	2.79	2.19	2.05	2.06	2.04	1.03	0.45	do	1.74	0.98
		Minimum	3.43	3.09	3.34	2.60	2.50	2.77	1.88	1.45	do	2.59	1.88
		Range	1.03	0.30	1.15	0.55	0.44	0.73	0.85	1.00	do	0.85	0.90
	Ten-day means	Maximum	2.96	2.93	2.30	2.15	2.18	2.29	1.16	1.03	do	1.90	1.01
		Minimum	3.29	2.96	2.76	2.40	2.39	2.51	1.43	1.20	do	2.55	1.76
		Range	0.33	0.03	0.46	0.25	0.21	0.22	0.27	0.17	do	0.65	0.75
May	Monthly means		3.04	2.81	2.27	2.11	1.92	2.11	1.12		1.52	1.34	0.91
	Daily record	Maximum	1.95	2.49	1.87	1.85	1.52	1.87	*0.02		0.63	1.05	0.76
		Minimum	3.48	3.19	2.93	2.40	2.33	2.52	1.73		3.08	2.09	1.11
		Range	1.53	0.70	1.06	0.55	0.81	0.65	1.75		2.45	1.05	0.35
	Ten-day means	Maximum	2.96	2.66	2.12	2.08	1.78	1.97	1.07		1.29	1.07	0.84
		Minimum	3.12	2.95	2.41	2.13	2.11	2.24	1.19		1.77	1.61	0.99
		Range	0.16	0.29	0.29	0.05	0.33	0.27	0.12		0.48	0.54	0.15
June	Monthly means		3.12	2.71	2.27	2.08	1.76	1.98	1.26	1.27	1.40	1.11	0.91
	Daily record	Maximum	2.78	2.49	1.99	1.90	1.54	1.72	1.03	1.05	0.68	0.94	0.81
		Minimum	3.33	2.99	2.61	2.35	1.97	2.21	1.63	1.80	1.83	1.24	1.13
		Range	0.55	0.50	0.62	0.45	0.43	0.49	0.60	0.75	1.15	0.30	0.32
	Ten-day means	Maximum	3.03	2.68		2.07	1.70	1.92	1.22	1.17	1.26	1.02	0.84
		Minimum	3.14	2.75		2.10	1.85	2.06	1.30	1.63	1.58	1.18	1.05
		Range	0.11	0.07		0.03	0.15	0.14	0.08	0.46	0.32	0.16	0.21

G 1.

Additional corrections to be made in Vol. II of the documents accompanying the President's message of December, 1860, *to the two houses of Congress, indicated as Senate Executive Document No.* 1, *of the* 36*th Congress,* 2*d session. Printed in* 8*vo,* 996 *pages.*

Page.	Line from top.	
586	17	Table A 8. "Before the moon's meridian passage." In the column headed "Observed elevation of the lake surface in decimals of a foot," for ordinate "0.089" read "0.098."
587	..	Fig. 1, tidal curve. For ordinate ".089" read ".098."
598	23	January 2, 1859, *6h.* 00*m.* p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "32°.5" read "32°.3."
605	16	January 5. In the 2d column, headed "Time of observation, (civil account,)" for "8*h.* 40*m.* a. m." read "8*h.* 45*m.* a. m."
605	30	January 5, noon. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "33°.2" read "32°.2."
607	..	From January 5, 11*h.* 00*m.* p. m., to January 6, 3*h.* 00*m.* a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "NW. by N." read "N."
609	..	In the fourth remark, after the word "drift" insert the word "ice."
618	8	January 12, 0*h.* 30*m.* p. m. In the 10th column, headed "Clouds," strike out "stratus 9¾."
622	..	From January 14, 9*h.* 00*m.*, to January 15, 2*h.* 30*m.* a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "N. by W." read "N."
623	..	From January 15, 2*h.* 53*m.* a. m., to January 15, 5*h.* 00*m.* a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "N. by W." read "N."
626	13–14	January 17, 7*h.* 30*m.* a. m. and 8*h.* 00*m.* a. m. In the 7th column, headed "Wind, course from whence," for "N. by W." read "N."
627	15	January 17, 3*h.* 00*m.* p. m. In the 10th column, headed "Clouds," strike out "Cirrus 10."
628	7	January 17, 11*h.* 00*m.* p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.88" read "3.68."
628	12	January 17. In the 2d column, headed "Time of observation, (civil account,)" complete the word "midnight."
628	13	January 18. In the 2d column, headed "Time of observation, (civil account,)" strike out the letters "i-g-h-t" after "0*h.* 15*m.* a. m."
629	16.	January 18, 7*h.* 30*m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "2.98" read "2.88."
629	..	In the last remark, after the word "basin" insert the word "it."
639	..	From January 22, 1*h.* 00*m.* a. m., to January 22, 3*h.* 30*m.* a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "W.NW." read "NW."
640	..	In the last remark on this page, after the word "river" place a comma (,). In the same remark, for "is" read "are."

Page.	Line from top.	
651	..	From January 40, 1*h*. 30*m*. a. m., to January 30, 3*h*. 30*m*. a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "W.NW." read "NW."
652	14	January 30. In the 2d column, headed "Time of observation, civil account,)" for "5*h*. 3*m*. a. m." read "5*h*. 30*m*. a. m."
656	4	February 1, 0*h*. 30*m*. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.24" read "3.29."
657	10	February 1, 8*h*. 45*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.10" read "3.18."
657	40	February 1, 3*h*. 59*m*. p. m. In the 3d column, headed "Moon's phases," insert the word "sets."
659	6	February 2, 0*h*. 15*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-guage, in feet and decimals," for "3.51" read "3.54."
664	6	February 4, 2*h*. 30*m*. a. m. In the 9th column, headed "Weather," for "do." read "clear."
664	9	February 4, 4*h*. 00*m*. a. m. In the 9th column, headed "Weather," for "do." read "tolerably clear."
664	10	February 4, 4*h*. 30*m*. a. m. In the 9th column, headed "Weather," for "do." read "cloudy."
664	20–21	February 4, 9*h*. 00*m*. a. m. In the 10th column, headed "Clouds," for "Cu. stratus and *Cer*. 8" read "Cu. str. and *Cir*. 8."
660	..	February 5. Opposite 5*h*. 00*m*. p. m., transfer the temperature of the external air 24°; barometer, in inches and decimals, 29.548; and temperature of the mercury in the barometer 71°.2 from this line to the fourth line below, or opposite to 6*h*. 00*m*. p. m.
677	18	February 10, 5*h*. 30*m*. a. m. In the 3d column, headed "Moon's phases," insert "L. C."
679	..	In the 3d remark, after the word "river" place a comma (,); in the same remark, strike out the word "also;" again in the same remark, after the word "seen" and before the word "with" insert the words "is covered." The sentence will then read thus: "The river, and harbor entrance are frozen, and the lake, as far as can be seen, is covered with drift ice blown on the shore by the late north and northeast winds, which has become compact and frozen.
683	8	February 13, 11*h*. 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.26" read "3.36."
683	30	February 14, 9*h*. 36*m*. a. m. In the 3d column, headed "Moon's phases," insert "L. C."
683	31	February 14, 10*h*. 00*m*. a. m. In the 3d column, headed "Moon's phases," strike out "L. C."
687	39	February 16, 6*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cirrus 15" read "Cirrus 1.5."
700	13	February 22. In the 2d column, headed "Time of observation, (civil account,)" for 3*h*. 30*m*. p. m." read "2*h*. 30*m*. p. m."
700	17	February 22, 4*h*. 32*m*. p. m. In the 3d column, headed "Moon's phases," insert "L. C."

Page.	Line from top.	
705	39	February 24. In the 2d column, headed "Time of observation, (civil account,)" for "0*h*. 15*m*. p. m." read "9*h*. 15*m*. p. m."
712	19	February 27, 8*h*. 30*m*. p. m. In the 10th column, headed "Clouds," for "Cu. str. 7" read "Cirrus 1."
713	5	February 28. In the 2d column, headed "Time of observation, (civil account,)" insert "3*h*. 00*m*. a. m."
714	10	March 1, 0*h*. 30*m*. a. m. In the 7th column, headed "Wind, course from whence," for "S.SE." read "SE."
714	11	March 1, 1*h*. 00*m*. a. m. In the 7th column, headed "Wind, course from whence," for "S.SE." read "SE."
723	40	or line 3 from bottom. March 5, 3*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "*Cirro* 3" read "*Cirrus* 3."
730	2	March 8, noon. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str."
731	26	March 9. In the 2d column, headed "Time of observation, (civil account,)" for "0*h*. 3*m*. p. m." read "0*h*. 30*m*. p. m."
733	8	March 10, noon. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str."
734	3	March 11. In the 2d column, headed "Time of observation, (civil account,)" for "5*h*. 2*m*. a m." read "5*h*. 20*m*. a. m."
735	3	March 11, 6*h*. 00*m*. p. m. In the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for "49°.7" read "69°.7."
737	21	March 13, 10*h*. 00*m*. a. m. In the 10th column, headed "Clouds," for "Cirrus 5" read "Cirrus 0.5."
740	24	or line 4 from bottom. March 15, 3*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cirrus 5" read "Cirrus 0.5."
746	1	March 18. In the 2d column, headed "Time of observation, (civil account,)" after "3*h*. 55*m*." insert the letters "p. m.," so as to read "3*h*. 55*m*. p. m."
746	11	March 18, 6*h*. 30*m*. p. m. In the 3d column, headed "Moon's phases," insert the word "rises."
746	11	March 18, 6*h*. 30*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," insert "3.56."
763	1	March 26, 0*h*. 30*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.47" read "3.37."
766	1	March 27, 4*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str. 7."
767	27	March 28, 7*h*. 00*m*. a. m. In the 7th column, headed "Wind, course from whence." for "NN." read "NE."
768	..	In the fourth remark, for "***raises***" read "***rises***."
769	..	In the 3d remark, after the word "and" and before the word "were" insert the word "we."
770	13	March 29, 9*h*. 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," insert "3.46."
771	.	On the 5th line in the 6th remark, for "***instants***" read "***instant***."
771	..	On the 14th and 15th lines in the 6th remark, for "***lakewark***" read "***lakeward***."

Page.	Line from top.	
774	19	April 1, 3*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str."
775	..	In the 1st remark, for "done" read "did."
776	16	April 2, 5*h*. 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.57" read "3.75."
777	21	April 3. In the 2d column, headed "Time of observation, (civil account,)" for "1*h*. 30*m*. a. m." read "0*h*. 30*m*. a. m."
777	22	April 3. In the 2d column, headed "Time of observation, (civil account,)" for "1*h*. 45*m*. a. m." read "0*h*. 45*m*. a. m."
780	15	April 4, 0*h*. 15*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.69" read "3.69."
787	39	April 7, 11*h*. 50*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.43" read "3.48."
788	7	April 8, 4*h*. 15*m*. a. m. In the 3d column, headed "Moon's phases," insert the letters "L. C."
788	8	April 8, 4*h*. 30*m*. a. m. In the 3d column, headed "Moon's phases," strike out the letters "L. C."
789	35	April 9, 5*h*. 30*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.52" read "3.59."
790	7	April 9, noon. In the 10th column, headed "Clouds," for "cloudless" read "stratus 5."
797	37	April 11, 3*h*. 30*m*. p. m. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str. and stratus 10."
801	35	April 13. In the 2d column, headed "Time of observation, (civil account,)" for "11*h*. 00*m*. a. m." read "10*h*. 00*m*. a. m."
812	26	or line 2 from bottom. April 18, 3*h*. 00*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "49°" read "52°."
816	28	April 20. In the 2d column, headed "Time of observation, (civil account,)" for "1*h*. 50*m*. p. m." read "2*h*. 50*m*. p. m."
817	2	April 20, 6*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "cloudless" read "Cirrus 2.5."
819	21	April 22, 7*h*. 00*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.62" read "4.69."
826	7	April 25, 6*h*. 15*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.29" read "4.29."
829	30	April 26, 10*h*. 45*m*. p. m. In the 7th column, headed "Wind, course from whence." for "N.NE." read "NE."
829	31	April 26, 11*h*. 00*m*. p. m. In the 7th column, headed "Wind, course from whence," for "N.NE." read "NE."
829	32	April 26, 11*h*. 15*m*. p. m. In the 7th column, headed "Wind, course from whence," for "N.NE." read "NE."
830	8	April 27, 7*h*. 00*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.39" read "4.29."
830	10	April 27, 8*h*. 00*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.27" read "4.37."

Page.	Line from top.	
837	34	May 2, 4*h*. 20*m*. a. m. In the 3d column, headed "Moon's phases," for "sets" read "rises."
847	11	May 6. In the 2d column, headed "Time of observation, (civil account,)" for "5*h*. 3*m*. a. m." read "5*h*. 30*m*. a. m."
848	6	May 6, 11*h*. 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "2.89" read "3.89."
855	5	May 10. In the 2d column, headed "Time of observation, (civil account,)" for "7*h*. 10*m* a. m." read "7*h*. 15*m*. a. m."
855	18	May 10. In the 2d column, headed "Time of observation, (civil account,)" for "10*h*. 30*m*. a. m." read "10*h*. 15*m*. a. m."
855	19	May 10 In the 2d column, headed "Time of observation, (civil account,)" for "10*h*. 15*m*. a. m." read "10*h*. 30*m*. a. m."
856	9	May 10, 6*h*. 15*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide gauge, in feet and decimals." for "4.16" read "4.19."
857	5	May 10. In the 2d column, headed "Time of observation, (civil account,)" for "12*h*. 45*m*. p. m." read "11*h*. 45*m*. p. m."
860	15	May 12, 8*h*. 55*m*. p. m. In the 3d column, headed "Moon's phases," insert the letters "U. O."
877	19	May 21, noon. In the 10th column, headed "Clouds," for "Cir. str. 5" read "Cu. str. 5."
877	25	May 21, 3*h*. 00*m*. p. m. In the 10th column, "headed "Clouds," for "Cirrus 0.5" read "Cirro stratus 5."
880	3	May 23, 8*h*. 00*m*. a. m. In the 10th column, headed "Clouds," for "Cir. str. 5" read "Cirro str. 1.5."
881	36	May 24, 0*h*. 35*m*. a m. In the 3d column, headed "Moon's phases," insert the word "rises."
886	1	May 25, noon. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "64°.2" read "61°.2."
890	21	May 28, 2*h*. 00*m*. a. m. In the 3d column, headed "Moon's phases," insert the word "rises."
897	9	May 31. In the 2d column, headed "Time of observation, (civil account,)" for "10*h*. 30*m*. p. m." read "11*h*. 30*m*. p. m."
898	23	June 1, 0*h*. 30*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.49" read "4.39."
905	37	June 4, 4*h*. 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "6.60" read "4.60."
912	9	June 7. In the 2d column, headed "Time of observation, (civil account,)" for "10*h*. 45*m*. p. m." read "11*h*. 45*m*. p. m."
916	..	June 9. Between "4*h*. 30*m*. p. m." and "5*h*. 00*m*. p. m." insert "4*h*. 57*m*. p. m.," and opposite this, in the 3d column, headed "Moon's phases," insert "1st quarter."
923	26	June 14, 7*h*. 15*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.34" read "4.30."

Page.	Line from top.	
924	23	June 14, *4h. 45m.* p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.00" read "4.40."
927	8	June 15, *0h. 15m.* p. m. In the 3d column, headed "Moon's phases," insert the letters "L. C."
927	9	June 15, *0h. 25m.* p. m. In the 3d column, headed "Moon's phases," strike out the letters "L. C."
929	31	June 16, *10h. 15m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.34" read "4.30."
932	9	June 18, *2h. 20m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.56" read "4.54."
936	7	June 20. In the 2d column, headed "Time of observation, (civil account,)" for "*5h. 3m.* p. m." read "*5h. 30m.* p. m."
940	9	June 23, *0h. 15m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.48" read "4.35."
944	2	June 24, *8h. 00m.* a. m. In the 10th column, headed "Clouds," for "stratus 7" read "Cirro stratus 7."
952	22	June 29, *11h. 5m.* a. m. In the 3d column, headed "Moon's phases," insert the letters "U. C."
953	3	June 29, *3h. 00m.* p. m. In the 10th column, headed "Clouds," for "Cir. str. 6" read "Cirrus 1."
958	6	July 1, *6h. 00m.* p. m. In the 10th column, headed "Clouds," for "Nebula 2.5" read "Cirrus 0.5."
4*	29	In the 2d column, at right-hand side, headed "Moon's apparent declination at time of her meridian transit," preceding 1°—16′, change the sign minus (—) to plus (+).
5*	27	In the 2d column, at right-hand side, headed "Moon's apparent declination at time of her meridian transit," preceding 1°—19′, change the sign plus (+) to minus (—).
5*	28	In the 2d column, at right-hand side, headed "Moon's apparent declination at time of her meridian transit," preceding 1°—43′, change the sign minus (—) to plus (+).

G 2.

Additional corrections to be made in the annual report of the Topographical Bureau of the War Department for the year 1860. *Printed in* 8*vo.* 672 *pages.*

298	17	Table A 8. Before the moon's meridian passage. In the column headed "Observed elevation of the lake surface, in decimals of a foot," for ordinate "0.089" read "0.098."
299	..	Fig. 1, tidal curve. For ordinate ".089" read ".098."
310	23	January 2, 1859, *6h. 00m.* In the 4th column, headed "Temperature of the external air, (Fahrenheit.)" for "32°.5" read "32°.3."
317	16	January 5. In the 2d column, headed "Time of observation, (civil account,)" for "*8h. 40m.* a. m." read "*8h. 45m.* a. m."
317	30	January 5, noon. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "33°.2" read "32°.2."

Page.	Line from top.	
319	..	From January 5, 11*h*. 00*m*. p. m., to January 6, 3*h*. 00*m*. a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "NW. by N." read "N."
321	..	In the 4th "remark," after the word "drift" insert the word "ice."
330	8	January 12, 0*h*. 30*m*. p. m. In the 10th column, headed "Clouds," strike out "stratus 9¾."
334	..	From January 14, 9*h*. 00*m*. p. m., to January 15, 2*h*. 30*m*. a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "N. by W." read "N."
335	..	From January 15, 2*h*. 53*m*. a. m., to January 15, 5*h*. 00*m*. a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "N. by W." read "N."
338	13–14	January 17, 7*h*. 30*m*. a. m. and 8*h*. 00*m*. a. m. In the 7th column, headed "Wind, course from whence," for "N. by W." read "N."
339	15	January 17, 3*h*. 00*m*. p. m. In the 10th column, headed "Clouds," strike out "Cirrus 10."
340	7	January 17, 11*h*. 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.88" read "3.68."
340	12	January 17. In the 2d column, headed "Time of observation, (civil account,)" complete the word "Midnight."
340	13	January 18. In the 2d column, headed "Time of observation, (civil account,)" strike out the letters "i-g-h-t" after "0*h*. 15*m*. a. m."
341	16	January 18, 7*h*. 30*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "2.98" read "2.88."
341	..	In the last "remark," after the word "basin" insert the word "it."
351	..	From January 22, 1*h*. 00*m*. a. m., to January 22, 3*h*. 30*m*. a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "W.NW." read "NW."
352	..	In the last remark on this page, after the word "river" place a comma (,). In the same remark, for "is" read "are."
363	..	From January 30, 1*h*. 30*m*. a. m., to January 30, 3*h*. 30*m*. a. m., inclusive. In the 7th column, headed "Wind, course from whence," for "W.NW." read "NW."
364	14	January 30. In the 2d column, headed "Time of observation, (civil account,)" for "5*h*. 3*m*. a. m." read "5*h*. 30*m*. a. m."
368	4	February 1, 0*h*. 30*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.24" read "3.29."
369	10	February 1, 8*h*. 45*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.10" read "3.18."
369	40	February 1, 3*h*. 59*m*. p. m. In the 3d column, headed "Moon's phases," insert the word "sets."
371	6	February 2, 0*h*. 15*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.51" read "3.54."
376	6	February 4, 2*h*. 30*m*. a. m. In the 9th column, headed "Weather," for "do." read "clear."

Page.	Line from top.	
376	9	February 4, 4*h*. 00*m*. a. m. In the 9th column, headed "Weather," for "do." read "tolerably clear."
376	10	February 4, 4*h*. 30*m*. a. m. In the 9th column, headed "Weather," for "do." read "cloudy."
376	20–21	February 4, 9*h*. 00*m*. a. m. In the 10th column, headed "Clouds," for "Cu. str. and *Cer*. 8" read "Cu. str. and *Cir*. 8."
380	..	February 5. Opposite 5*h*. 00*m*. p. m., transfer the temperature of the external air 24°; barometer, in inches and decimals, 29.548; and temperature of the mercury in the barometer, 71°.2, from this line to the fourth line below, or opposite to 6*h*. 00*m*. p. m.
389	18	February 10, 5*h*. 30*m*. a. m. In the 3d column, headed "Moon's phases," insert "L. C."
391	..	In the 3d remark, after the word "river" place a comma (,); in the same remark, strike out the word "also;" again, in the same remark, after the word "seen" and before the word "with" insert the words "is covered." The sentence will then read thus: "The river, and harbor entrance, are frozen, and the lake, as far as can be seen, is covered with drift ice blown on the shore by the late north and northeast winds, which has become compact and frozen."
395	8	February 13, 11*h*. 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.26" read "3.36."
395	30	February 14, 9*h*. 36*m*. a. m. In the 3d column, headed "Moon's phases," insert "L. C."
395	31	February 14, 10*h*. 00*m*. a. m. In the 3d column, headed "Moon's phases." strike out "L. C."
399	39	February 16, 6*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cirrus 15" read "Cirrus 1.5."
412	13	February 22. In the 2d column, headed "Time of observation, (civil account,)" for "3*h*. 30*m*. p. m." read "2*h*. 30*m*. p. m."
412	17	February 22, 4*h*. 32*m*. p. m. In the 3d column, headed "Moon's phases," insert "L. C."
417	39	February 24. In the 2d column, headed "Time of observation, (civil account,)" for "0*h*. 15*m*. p. m." read "9*h*. 15*m*. p. m."
424	19	February 27, 8*h*. 30*m*. p. m. In the 10th column, headed "Clouds," for "Cu. str. 7" read "Cirrus 1."
425	5	February 28. In the 2d column, headed "Time of observation, (civil account,)" insert "3*h*. 00*m*. a. m."
426	10	March 1, 0*h*. 30*m*. a m. In the 7th column, headed "Wind, course from whence," for "S.SE." read "SE."
426	11	March 1, 1*h*. 00*m*. a. m. In the 7th column, headed "Wind, course from whence," for "S.SE." read "SE."
434	40	or line 3 from bottom. March 5, 3*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cirro 3" read "Cirrus 3."
442	2	March 8, noon. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str."
443	26	March 9. In the 2d column, headed "Time of observation, (civil account,)" for "0*h*. 3*m*. p. m." read "0*h*. 30*m*. p. m."
445	8	March 10, noon. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str."

Page.	Line from top.	
446	3.	March 11. In the 2d column, headed "Time of observation, (civil account,)" for "5*h*. 2*m*. a. m." read "5*h*. 20*m*. a. m."
447	3	March 11, 6*h*. 00*m*. p. m. In the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for "49°.7" read "69°.7."
449	21	March 13, 10*h*. 00*m*. a. m. In the 10th column, headed "Clouds," for "Cirrus 5" read "Cirrus 0.5."
452	24	or line 4 from bottom. March 15, 3*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cirrus 5" read "Cirrus 0.5."
458	1	March 18. In the 2d column, headed "Time of observation, (civil account,)" after "3*h*. 55*m*." insert the letters "p. m.," so as to read "3*h*. 55*m*. p. m."
458	11	March 18, 6*h*. 30*m*. p. m. In the 3d column, headed "Moon's phases," insert the word "rises."
458	11	March 18, 6*h*. 30*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," insert "3.56."
475	1	March 26, 0*h*. 30*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.47" read "3.37."
478	1	March 27, 4*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str. 7."
479	27	March 28, 7*h*. 00*m*. a. m. In the 7th column, headed "Wind, course from whence," for "NN." read "NE."
480	..	In the 4th remark, for *raises* read "*rises*."
481	..	In the 3d remark, after the word "and" and before the word "were" insert the word "we."
482	13	March 29, 9*h*. 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," insert "3.46."
483	..	On the 5th line in the 6th remark, for "*instants*" read "*instant*."
483	..	On the 14th and 15th lines in the 6th remark, for "*lakewark*" read "*lakeward*."
486	19	April 1, 3*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str."
487	..	In the 1st remark, for "done" read "did."
488	16	April 2, 5*h*, 00*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.57" read "3.75."
489	21	April 3. In the 2d column, headed "Time of observation, (civil account,)" for "1*h*. 30*m*. a. m." read "0*h*. 30*m*. a. m."
489	22	April 3. In the 2d column, headed "Time of observation, (civil account,)" for "1*h*. 45*m*. a. m." read "0*h*. 45*m*. a. m."
492	15	April 4, 0*h*. 15*m*. a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.69" read "3.69."
499	39	April 7, 11*h*. 50*m*. p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.43" read "3.48."
500	7	April 8, 4*h*. 15*m*. a. m. In the 3d column, headed "Moon's phases," insert the letters "L. C."
500	8	April 8, 4*h*. 30*m*. a. m. In the 3d column, headed "Moon's phases," strike out the letters "L. C."

Page.	Line from top.	
501	35	April 9, *6h.* *30m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.52" read "3.59."
502	7	April 9, noon. In the 10th column, headed "Clouds," for "cloudless" read "stratus 5."
509	37	April 11, *3h.* *30m.* p. m. In the 10th column, headed "Clouds," for "Cu. str. 10" read "Cu. str. and stratus 10."
513	35	April 13. In the 2d column, headed "Time of observation, (civil account,)" for "*11h.* *00m.* a. m." read "*10h.* *00m.* a. m."
516	19	April 15, *1h.* *00m.* a. m. In the 8th column, headed "Wind, strength," for "V. strong" read "very strong."
524	26	or line 2 from bottom. April 18, *3h.* *00m.* p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "49°" read "52°."
528	28	April 20. In the 2d column, headed "Time of observation, (civil account,)" for "*1h.* *50m.* p. m." read "*2h.* *50m.* p. m."
529	2	April 20, *6h.* *00m* p. m. In the 10th column, headed "Clouds," for "cloudless" read "Cirrus 2.5."
531	21	April 22, *7h.* *00m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.62" read "4.69."
538	7	April 25,.*6h.* *15m.* p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "3.29" read "4.29."
541	30	April 26, *10h.* *45m.* p. m. In the 7th column, headed "Wind, course from whence," for "N.NE." read "NE."
541	31	April 26, *11h.* *00m.* p. m. In the 7th column, headed "Wind, course from whence," for "N.NE." read "NE."
541	32	April 26, *11h.* *15m.* p. m. In the 7th column, headed "Wind, course from whence," for "N.NE." read "NE."
542	8	April 27, *7h.* *00m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.39" read "4.29."
542	10	April 27, *8h.* *00m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-guage, in feet and decimals," for "4.27" read "4.37."
549	34	May 2, *4h.* *20m.* a. m. In the 3d column, headed "Moon's phases," for "*sets*" read "*rises*."
559	11	May 6. In the 2d column, headed, "Time of observation, (civil account,)" for "*5h.* *3m.* a. m." read "*5h.* *30m.* a. m."
560	6	May 6, *11h.* *00m.* p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "2.89" read "3.89."
567	5	May 10. In the 2d column, headed "Time of observation, (civil account,)" for "*7h.* *10m.* a. m." read "*7h.* *15m.* a. m."
567	18	May 10. In the 2d column, headed "Time of observation, (civil account,)" for "*10h.* *30m.* a. m." read "*10h.* *15m.* a. m."
567	19	May 10. In the 2d column, headed "Time of observation, (civil account,)" for "*10h.* *15m.* a. m." read "*10h.* *30m.* a. m."
568	9	May 10, *6h.* *15m.* p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.16" read "4.19."

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569	5	May 10. In the 2d column, headed "Time of observation, (civil account,)" for "12*h.* 45*m.* p. m." read "11*h.* 45*m.* p. m."
572	15	May 12, 8*h.* 55*m.* p. m. In the 3d column, headed "Moon's phases," insert the letters "U. C."
589	19	May 21, noon. In the 10th column, headed "Clouds," for "Cir. str. 5." read "Cu. str. 5."
589	25	May 21, 3*h.* 00*m.* p. m. In the 10th column headed "Clouds," for "Cirrus 0.5" read "Cirro stratus 5."
592	3	May 23, 8*h.* 00*m.* a. m. In the 10th column, headed "Clouds," for "Cir. str. 5." read "Cir. str. 1.5."
593	36	May 24, 0*h.* 35*m.* a. m. In the 3d column, headed "Moon's phases," insert the word "rises."
598	1	May 25, noon. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "64°.2" read "61°.2."
602	21	May 28, 2*h.* 00*m.* a. m. In the 3d column, headed "Moon's phases," insert the word "rises."
609	9	May 31. In the 2d column, headed "Time of observation, (civil account,)" for "10*h.* 30*m.* p. m." read "11*h.* 30*m.* p. m."
610	23	June 1, 0*h.* 30*m.* p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.49" read "4.39."
617	37	June 4, 4*h.* 00*m.* p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "6.60" read "4.60."
624	9	June 7. In the 2d column, headed "Time of observation, (civil account,)" for "10*h.* 45*m.* p. m." read "11*h.* 45*m.* p. m."
628	..	June 9. Between "4*h.* 30*m.* p. m." and "5*h.* 00*m.* p. m." insert "4*h.* 57*m.* p. m.;" and opposite this, in the 3d column, headed "Moon's phases," insert "1st qr."
635	26	June 14, 7*h.* 15*m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.34" read "4.30."
636	23	June 14, 4*h.* 45*m.* p. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.00" read "4.40."
639	8	June 15, 0*h.* 15*m.* p. m. In the 3d column, headed "Moon's phases," insert the letters "L. C."
639	9	June 15, 0*h.* 25*m.* p. m. In the 3d column, headed "Moon's phases," strike out the letters "L. C."
641	31	June 16, 10*h.* 15*m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.34" read "4.30."
644	9	June 18, 2*h.* 20*m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.56" read "4.54."
648	7	June 20. In the 2d column, headed "Time of observation, (civil account,)" for "5*h.* 3*m.* p. m." read "5*h.* 30*m.* p. m."
652	9	June 23, 0*h.* 15*m.* a. m. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "4.38" read "4.36."
656	2	June 24, 8*h.* 00*m.* a. m. In the 10th column, headed "Clouds," for "stratus 7" read "Cirro stratus 7."

Page.	Line from top.	
664	22	June 29, 11*h*. 5*m*. a. m. In the 3d column, headed "Moon's phases," insert the letters "U. C."
665	3	June 29, 3*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cir. str. 6" read "Cirrus 1."
670	2	July 1, 6*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Nebula 2.5" read "Cirrus 0.5."
4*	29	In the 2d column, at right-hand side, headed "Moon's apparent declination at time of her meridian transit," preceding 1° — 16′, change the sign minus (—) to plus (+).
5*	27	In the 2d column, at right-hand side, headed "Moon's apparent declination at time of her meridian transit," preceding 1° — 19′, change the sign plus (+) to minus (—).
5*	28	In the 2d column, at right-hand side, headed "Moon's apparent declination at time of her meridian transit," preceding 1° — 43′, change the sign minus (—) to plus (+).

G 3.

Corrections to be made in Vol. II of the documents accompanying the President's message of December, 1861, *to the two houses of Congress, indicated as Senate Executive Document No.* 1, *of the* 37*th Congress,* 2*d session. Printed in* 8*vo.,* 569 *pages.*

FLUCTUATIONS OF THE BAROMETER.

Page.	
322	Superior City. Mean for April, 1861: for "29.172" read "29.182."
322	Ontonagon. Mean for February, 1861: for "29.227" read "29.224."
322	Ontonagon. Mean for April, 1861: for "29.232" read "29.235."
322	Marquette. Mean for March, 1861: for "29.308" read "29.315."
322	Thunder Bay island. Range for March, 1860: for "0.939" read "1.039."
323	Charlotte. Maximum for April, 1860: for "30.898" read "30.355."
323	Charlotte. Range for April, 1860: for "1.819" read "1.276."
324	Marquette. Mean for June, 1861: for "29.264" read "29.261."
325	Detroit. Maximum for August, 1860, for "29.407" read "29.704."
326	Superior City. Minimum for November, 1859: for "28.625" read "28.525."
326	Superior City. Range for November, 1859: for "1.127" read "1.327."
326	Ottawa Point. Range for September, 1858: for "0.698" read "0.689"
326	Ottawa Point. Range for December, 1859: for "1.085" read "1.058."
326	Sackett's Harbor. Minimum for October, 1859: for "29.210" read "29.200."
327	Sackett's Harbor. In 1st column, headed "Year," for "1869" read "1859."
327	Sackett's Harbor. Maximumfor November, 1860: for "30.086" read "30.068."

PREVALENCE OF WINDS.

347–354	In table B, (appendix B.) In the headings of the last or extreme right-hand columns, for "No. of observations" read "No. of observations lost."

FLUCTUATIONS IN THE WATER LEVELS OF THE LAKES.

Page.	
355	September, 1860. Daily records, minimum at Cleveland: for "2.47" read "2.48."
355	September, 1860. Daily records, range at Thunder bay: for "0.76" read "0.70."
355	November, 1860. Monthly means at Milwaukie: for "2.64" read "2.68."
355	November, 1860. Daily records, minimum at Ontonagon: for "2.40" read "2.49."
355	November, 1860. Daily records, minimum at Milwaukie: for "1.34" read "3.34."
356	January, 1861. Monthly means at Pointe aux Barques: for "2.69" read "2.67."
356	January, 1861. Ten-day means, minimum at Niagara: for "......" read "2.65."
356	January, 1861. Ten day means, range at Niagara: for "......" read "0.08."
356	February, 1861. Monthly means at Niagara: for "......" read "2. 65."
356	February, 1861. Daily records, maximum at Niagara: for "......" read "2.59."
356	February, 1861. Daily records, minimum at Niagara: for "......" read "2.79."
356	February, 1861. Daily records, range at Niagara: for "......" read "0.20."
356	February, 1861. Ten-day means, maximum at Niagara: for "......" read "2.60."
356	February, 1861. Ten-day means, minimum at Niagara: for "......" read "2.71."
356	February, 1861. Ten-day means, range at Niagara: for "......" "0.11."
356	February, 1861. Ten-day means, range at Superior City: for "0.36" read "0.26."
356	April, 1861. Ten-day means, maximum at Marquette: for "2.60" read "2.41."
356	April, 1861. Ten-day means, range at Marquette: for "0.26" read "0.45."
357	June, 1861. Ten-day means, maximum at Presque Isle: for "1.35." read "1.30."
357	June, 1861. Ten-day means, range at Presque Isle: for "0.23" read "0.28."

Page.	Line from top.	
387	24–25	For "as superintendent of the N. and NW. lakes," read "as superintendent of the *survey of the* N. and NW. lakes."
390	55	In the 3d column, headed "second measurement," for Feet. In. 80ths. "450 4 46," read Feet. In. 80ths. "460 4 46."
408	10	October 10, 1857, 9*h*. 50*m*. a. m. In the 3d column, headed "Moon's phases and position," for "Last qr. 10*h*. 03*m*. a. m." read "Last qr. 0*h*. 03*m*. a. m.
408	17	October 17, 1857, 10*h*. 00*m*. a. m. In the 3d column, headed "Moon's phases and position," for "New, 3*h*. 48*m*. a. m." read "New, 3*h*. 48*m*. p. m."

Page.	Line from top.	
409	..	In the last remark on this page, for "snow at 9*h*. 30*m*. p. m." read "snow at 0*h*. 30*m*. p. m."
411	11	November 25, 1857, 9*h*. 10*m*. a. m. In the 8th column, headed "Wind, strength," for "do." read "Gentle."
411	20	November 26, 1857, 9*h*. 15*m*. a. m. In the 8th column, headed "Wind, strength," for "do." read "Light."
411	41	December 7, 1857, 9*h*. 40*m*. In the 11th column, headed "Height of the lake surface, as per tide-gauge, in feet and decimals," for "7.75" read "3.75."
412	3	December 12, 1857. In the 13th column, headed "Temperature of the external air, (Fahrenheit,) 6.00 a. m.," for "36°" read "31°."
412	15	December 19, 1857. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h*. 00*m*. p. m.," for "32°" read "30°."
412	16	December 20, 1857. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h*. 00*m*. p. m.," for "30°" read "32°."
412	31	December 30, 1857, 9*h*. 35*m*. a. m. In the 3d column, headed "Moon's phases and position," for "*Fullest*, 3*h*. 43*m*. p. m." read "*Full* at 3*h*. 43*m*. p. m."
413	22	January 16, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10.00 p. m.," for "43°" read "34°."
413	32	January 26, 1858, 11*h*. 30*m*. a. m. In the 10th column, headed "Clouds," for "do." read "Cir. cu. str. 10."
413	33	January 27, 1858, 9*h*. 30*m*. a. m. In the 10th column, headed "Clouds," for "do." read "Cu. str. 10."
413	41	January 30, 1858, 9*h*. 40*m*. a. m. In the 10th column, headed "Clouds," for "Cirrus 9" read "Cir. cu. str. 9."
416	27	February 24, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h*. 00*m*. p. m.," for "26°" read "20°."
417	36	March 3, 1858, 10*h*. 30*m*. a. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "9°" read "9°. 8."
418	1–2	March 6, 1858, noon. In the 10th column, headed "Clouds," for "*Thin stratus general*" read "*stratus* 10."
418	11	March 8, 1858, 3*h*. 00*m*. p. m. In the 5th column, headed "Barometer in inches and decimals," for "29.326" read "29.376."
418	23–24	March 10, 1858, 6*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "Cir. cu. str. 17" read "Cir. cu. str. 7."
418	..	In the last remark on this page, for "The mouth *or* the harbor" read "The mouth *of* the harbor."
419	20	March 14, 1858, 3*h*. 00*m*. p. m. In the 9th column, headed "Weather," for "Clo-dy" read "Cloudy."
419	..	In the 5th remark on this page, for "State and W*a*lcott streets" read "State and W*o*lcott streets."
419	31	March 15, 1858, noon. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "56°" read "65°."
420	25	March 20, 1858, 6*h*. 00*m*. p. m. In the 9th column, headed "Weather," for "do." read "Clear."

Page.	Line from top.	
421	40	March 31, 1858, 8*h*. 00*m*. a. m. In the 8th column, headed "Strength of wind," for "Fresh" read "Gentle."
423	51	In the 1st column, headed "Date, (civil account,)" insert the number "16."
423	..	Bottom line, in the 5th column, headed "Barometer in inches and decimals," for "9.448" read "29.448."
423	..	Bottom line, in the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for "94°.5" read "64°.5."
424	33	April 21, 1858, 3*h*. 00*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "63°.3" read "66.3."
425	17	April 23, 1858, 6*h*. 00*m*. p. m. In the 10th column, headed "Clouds," for "stratus 8" read "stratus 10."
425	20-21	April 24, 1858, noon. In the 10th column, headed "Clouds,"
425	41	April 27, 1858, 3*h*. 00*m*. p. m. In the 9th column, headed for "Cu. str. E. 9" read "Cu. str. E. and stratus west 8." "Weather," for "do." read "Clear."
427	19	May 8, 1858, 9*h*. 00*m*. a. m. In the 9th column, headed "Weather," for "do." read "Foggy and misty."
427	25	May 9, 1858, 9*h*. 00*m*. a. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "46°" read "44°."
428	17	May 15, 1858, 9*h*. 00*m*. a. m. In the 7th column, headed "Wind, course from whence," for "NE." read "NW."
428	20	May 15, 1858, 11*h*. 30*m*. a. m. In the 7th column, headed "Wind, course from whence," for "NW." read "N."
429	..	In the 3d remark on this page, for "*storn*" read "*storm*."
429	49	May 27, 1858, 3*h*. 00*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "68°.5" read "63°.5."
430	3	May 29, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h*. 00*m*. p. m.," for "06°" read "60°."
430	..	Bottom line, in the 7th column, headed "Wind, course from whence," after the word "by" insert the letter "S," so as to read "E. by S."
431	31	June 7, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "6*h*. 30*m*. p. m." read "6*h*. 00*m*. p. m."
431	33	June 8, 1858. In the 2d column, headed "Time of obervation, (civil account,)" for "9*h*. 40*m*." read "9*h*. 30*m*."
431	36	June 8, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "3*h*. 36*m*." read "3*h*. 30*m*."
432	18	June 13, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "8*h*. 50*m*. a. m." read "8*h*. 30*m*. a. m."
432	26	June 14, 1858. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "70°.3" read "70°.5."
432	34	June 16, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "9*h*. 15*m*. a. m." read "9*h*. 00*m*. a. m."
436	1	July 5, 1858. In the 2d column, headed "Time of observation, (civil account,)" after "6*h*. 00*m*." insert the letters "p. m.," so as to read "6*h*. 00*m*. p. m."

Page.	Line from top.	
443	46	August 20, 1858, 9*h*. 05*m*. a. m. In the 7th column, headed "Wind, course from whence," for "W." read "W.SW."
445	25	August 29, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "10*h*. 00*m*." read "10*h*. 40*m*."
445	38–39	August 31, 1858, 8*h*. 00*m*. a. m. In the 10th column, headed "Clouds," strike out the observation "Cir. cu. str. 4."
445	40	August 31, 1858, 9*h*. 20*m*. a. m. In the 10th column, headed "Clouds," for "Cirrus 4" read "Cir. cu. str. 4"
445	41	August 31, 1858, noon. In the 10th column, headed "Clouds," insert the observation "Cirrus 4."
445	44	August 31, 1858, 5*h*. 50*m*. p. m. In the 10th column, headed "Clouds," strike out the observation, "Cir. cu. str."
445	45	August 31, 1858, 6*h*. 00*m*. p. m. In the 10th column, headed "Clouds," insert the observation "Cir. cu. str."
445	45	August 31, 1858. In the 12th column, headed "Temperature of the external air, (Fahrenheit,) 5*h*. 00*m*. a. m.," strike out the observation "60°."
445	45	August 31, 1858. In the 13th column, headed "Temperature of the external air, (Fahrenheit,) 6*h*. 00*m*. a. m.," strike out the observation "61°."
445	45	August 31, 1858. In the 14th column, headed "Temperature of the external air. (Fahrenheit,) 10*h*. 00*m*. p. m.," strike out the observation "64°."
445	46	September 1, 1858. In the 12th, 13th and 14th columns, headed "Temperature of the external air, (Fahrenheit,) 5*h*. a. m., 6*h*. a. m., 10*h*. p. m.," insert the observations "60°," "61°," "64°."
446	3	September 2, 1858, 3*h*. 00*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "74°" read "74°.5."
447	17	September 8, 1858, noon. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for 80°.8" read "80°."
450	11	September 24, 1858, 11*h*. 40*m*. a. m. In the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for 58°.5" read "68°.5."
452	..	3d line from the bottom. October 6, 1858. In the 2d column, headed "Time of observation (civil account,)" for "4*h*. 25*m*. p. m." read "4*h*. 45*m*. p. m."
453	..	In the third remark on this page, after the last letter in this remark, place the letters "*a y*," so as to read "heavy dead sea rolling all this day."
453	23	October 9, 1858, 5*h*. 30*m*. p. m. In the 8th column, headed "Wind, strength," for "no" read "do."
455	11	October 19, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "6*h* 25*m*. a. m." read "9*h*. 25*m*. a. m."
456	9	October 25, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "2*h*. 03*m*. p. m." read "2*h*. 37*m*. p. m."
458	20	November 3, 1858, 3*h*. 00*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "21°.8" read "51°.8."
458	..	In the 10th remark on this page, for "*Northeart*" read "*Northeast*."

Page.	Line from top.	
459	2	November 6. 1858. 8*h*. 00*m*. a. m. In the 5th column, headed "Barometer in inches and decimals," for "59.286" read "29. 286."
459	8	November 6, 1858, 6*h*. 00*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "42°.5" read "41°.5."
459	9	November 7, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 6*h*. 00*m*. p. m.," insert the observation "42°."
459	.	In the 2d remark on this page, for "*North ide*" read "*North side*."
459	16	November 8, 1858, noon. In the 5th column, headed "Barometer in inches and decimals," for "22.469" read "29.469."
459	32	November 10, 1858, noon. In the 5th column, headed "Barometer in inches and decimals," for "99.471" read "29.471."
460	8	November 14, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 6*h*. 00*m*. p. m." insert observation "29°."
460	..	Bottom line, November 18, 1858, 8*h*. 00*m*. a. m. In the 10th column, headed "Clouds, for "Srratus 10" read "Stratus 10."
461	..	In the 2d remark on this page, for "*Take*" read "*Lake*."
461	23	November 20, 1858, 3*h*. 45*m*. p. m. In the 9th column, headed "Weather," for "*da*" read "*do*."
461	..	In the 12th remark on this page, for "*tolerable* rough" read "*tolerably* rough."
462	6	November 25. 1858, 9*h*. 00*m* a. m. In the 5th column, headed "Barometer in inches and decimals," for "29.661" read "29. 691."
462	..	Bottom line, November 28, 1858, 11*h*. 30*m*. a. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "34°.8" read "36°.8."
463	1	November 28, 1858. In the 2d column, headed "Time of observation, (civil account,)" strike out the word "noon."
463	1	November 28, 1858. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" strike out the observation "40°."
463	2	November 28, 1858, 1*h*. 10*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" insert "38°."
463	4	In the 1st column, headed "(civil account,)" insert the number "29."
463	9	November 29, 1858, 3*h*. 00*m*. p. m. In the 5th column, headed "Barometer in inches and decimals," for "29.23" read "29.236."
466	19	December 6, 1858, 8*h*. 00*m*. a. m. In the 5th column, headed "Barometer in inches and decimals," for "39.656" read "29.656."
467	1	December 17, 1858, 9*h*. 00*m*. a. m. In the 11th column, headed "Height of lake surface, as per tide-gauge, in feet and decimals," for "4.17" read "4.07."
467	15	December 19, 1858, noon. In the 5th column, headed "Barometer in inches and decimals," for "29.493," read "29.403."
467	37	December 22, 1858, 9*h*. 50*m*. a. m. In the 9th column, headed "Weather," for "Clear" read "Cloudy."

Page.	Line from top.	
467	37	December 22, 1858. In the 12th, 13th, 14th and 15th columns, headed "Temperature of the external air, (Fahrenheit,) 5*h.* a. m., 6*h.* a. m., 6*h.* p. m., and 10*h.* p. m," strike out observations "21°, 22°, 33°, 33°," and insert in the stead of, "20°, 20°, 32°, 31°."
468	14	December 24, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "3*h.* 00*m.* a. m." read "3*h.* 00*m.* p. m."
469	3	December 28, 1858, 9*h.* 00*m.* a .m. In the 6th column, headed "Temperature of the mercury in the Barometer, (Fahrenheit,)" for "27°" read "72°."
469	14	December 29, 1858, 6*h.* 00*m.* p. m. In the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for "70°.5" read "77°.5."
469	15	December 30, 1868, 8*h.* 00m. a. m. In the 3d column, headed "Moon's phases and position," strike out the letter "s."
469	16	December 30, 1858, 8*h.* 20*m.* a. m. In the 3d column, headed "Moon's phases and position," insert the letter "s."
469	18	December 30, 1858, 9*h.* 00*m.* a. m. In the 5th column, headed "Barometer in inches and decimals," for "19.054" read "29.054."
470	1	For "service" read "surface."
470	24	June 20, 1858, 8*h.* 45*m.* a. m. In the 3d column, headed "Readings of tide-gauge, in feet and decimals," for "4.40" read "4.30."
470	42	July 16, 1858. In the 4th column, headed "Mean solar time of observation," for "11*h.* 30*m.* a. m." read "11*h.* 31*m.* a. m."
478	36	In the 2d column, headed "Average above 0 (zero) of tide-gauge, in feet and decimals," for "2.22" read "3.22."
479	5	In the 4th column, headed "Minima above 0 (zero) of tide gauge, in feet and decimals," for "2.58" read "2.55."

G 4.

Corrections to be made in the annual report of the Topographical Bureau of the War Department, for the year 1861. *Printed in 8vo,* 453 *pages.*

FLUCTUATIONS OF THE BAROMETER.

Page.	
206	Superior City. Mean for April, 1861: for "29.172" read "29.182."
206	Ontonagon. Mean for February, 1861: for "29.227" read "29.224."
206	Ontonagon. Mean for April, 1861: for "29.232" read "29.235."
206	Marquette. Mean for March, 1861: for "29.308" read "29.315."
206	Thunder Bay island. Range for March, 1860: for "0.939" read "1.093."
207	Charlotte. Maximum for April, 1860: for "30.898" read "30.355."
207	Charlotte. Range for April, 1860: for "1.819" read "1.276."
208	Marquette. Mean for June, 1861: for "29.264" read "29.261."
209	Detroit. Maximum for August, 1860: for "29.407" read "29.704."
210	Superior City. Minimum for November, 1859: for "28.625" read "28.525."

Page.	
210	Superior City. Range for November, 1859: for "1.127" read "1.327."
210	Ottawa Point. Range for September, 1858: for "0.698" read "0.689."
210	Ottawa Point. Range for December, 1859: for "1.085" read "1.058."
211	Sackett's Harbor. Minimum for October, 1859: for "29.210" read "29,200."
211	Sackett's Harbor. In the 1st column, headed "Year," for "1869" read "1859."
211	Sackett's Harbor. Maximum for November, 1860: for "30.086" read "30.068."

PREVALENCE OF WINDS.

231–238	In Table B, (Appendix B.) In the headings of the last or extreme right-hand columns: for "No. of observations," read "No. of observations lost."

FLUCTUATIONS IN THE WATER LEVELS OF THE LAKES.

239	September, 1860. Daily records. Minimum at Cleveland: for "2.47" read "2.48."
239	September, 1860. Daily records. Range at Thunder Bay: for "0.76" read "0.70."
239	November, 1860. Monthly means at Milwaukee: for "2.64" read "2.68."
239	November, 1860. Daily records. Minimum at Ontonagon: for "2.40" read "2.49."
239	November, 1860. Daily records. Minimum at Milwaukee: for "1.34" read "3.34."
240	January, 1861. Monthly means at Pointe aux Barques: for "2.69" read "2.67."
240	January, 1861. Ten-day means. Minimum at Niagara: for "......" read "2.65."
240	January, 1861. Ten-day means. Range at Niagara: for "......" read "0.08."
240	February, 1861. Monthly means at Niagara: for "......" read "2.65."
240	February, 1861. Daily records. Maximum at Niagara: for "......" read "2.59."
240	February, 1861. Daily records. Minimum at Niagara: for "......" read "2.79."
240	February, 1861. Daily records. Range at Niagara: for "......" read "0.20."
240	February, 1861. Ten-day means. Maximum at Niagara: for "......" read "2.60."
240	February, 1861. Ten-day means. Minimum at Niagara: for "......" read "2.71."
240	February, 1861 Ten-day means. Range at Niagara: for "......" read "0.11."
240	February, 1861. Ten-day means. Range at Superior City: for "0.36" read "0.26."
240	April, 1861. Ten-day means. Maximum at Marquette: for "2.60" read "2.41."
240	April, 1861. Ten-day means. Range at Marquette: for "0.26" read "0.45."
241	June, 1861. Ten-day means. Maximum at Presqu' Isle: for "1.35" read "1.30."

Page.	
241	June, 1861. Ten-day means. Range at Presqu' Isle: for "0.23" read "0.28."

Page.	Line from top.	
271	24–25	For "as superintendent of the N. and NW. lakes," read "as superintendent of the *survey of the* N. and NW. lakes."
274	55	In the 3d column, headed "Second measurement," for "450 feet 4 inches, 46.80," read "460 feet 4 inches, 46.80."
292	10	October 10, 1857, 9*h*. 50*m*. a. m. In the 3d column, headed "Moon's phases and position," for "last qr. 10*h*. 03*m*. a. m." read "last qr. 0*h*. 03*m*. a. m."
293	17	October 17, 1857, 10*h*. 00*m*. a. m. In the 3d column, headed "Moon's phases and position," for "new 3*h*. 48*m*. a. m." read "new 3*h*. 48*m*. p. m."
293	..	In the last remark on this page, for "snow at 9*h*. 30*m*. p. m." read "snow at 0*h*. 30*m*. p. m."
295	11	November 25, 1857, 9*h*. 10*m*. a. m In the 8th column, headed "Wind, strength," for "do." read "Gentle."
295	20	November 26, 1857, 9*h*. 15*m*. a. m. In the 8th column, headed "Wind, strength," for "do." read "Light."
295	41	December 7, 1857, 9*h*. 40*m*. a. m. In the 11th column, headed "Height of lake surface, as per tide-gauge, in feet and decimals," for "7.75" read "3.75."
296	3	December 12, 1857. In the 13th column, headed "Temperature of the external air, (Fahrenheit,) 6*h*. 00*m*. a. m.," for "36°" read "31°."
296	15	December 19, 1857. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h*. 00*m*. p. m.," for "32°" read "30°."
269	16	December 20, 1857. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h*. 00*m*. p. m." for "30°" read "32°."
296	31	December 30, 1857, 9*h*. 35*m*. a. m. In the 3d column, headed "Moon's phases and position," for "*fullest* 3*h*. 43*m*. p. m." read "*full at* 3*h*. 43*m*. p. m."
297	22	January 16, 1858. In the 15th column, headed "Temperature of the external air, (Fahrenheit,) 10*h* 00*m*. p. m.," for "43°" read "34°."
297	32	January 26, 1858, 11*h*. 30*m*. a. m. In the 10th column, headed "Clouds," for "do." read "Cir. cu. str. 10."
297	33	January 27, 1858, 9*h*. 30*m*. a. m. In the 10th column, headed "Clouds," for "do." read "Cu. str. 10."
297	41	January 30, 1858, 9*h*. 40*m*. a. m. In the 10th column, headed "Clouds," for "Cirrus 9" read "Cir. cu. str. 9."
300	27	February 24, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h*. 00*m*. p. m.," for "26°" read "20°."
301	36	March 3, 1858, 10*h*. 30*m*. a. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "9°" read "9°.8."
302	1–2	March 6, 1858, noon. In the 10th column, headed "Clouds," for "thin stratus general" read "stratus 10."
302	11	March 8, 1858, 3*h*. 00*m*. p. m. In the 5th column, headed "Barometer, in inches and decimals," for "29.326" read "29.376."

Page.	Line from top.	
302	23–24	March 10, 1858, 6*h.* 00*m.* p. m. In the 10th column, headed "Clouds," for "Cir. cu. str. 17" read "Cir cu. str. 7."
302	..	In the last remark on this page, for "the mouth *or* the harbor" read "the mouth *of* the harbor."
303	20	March 14, 1858, 3*h.* 00*m.* p. m. In the 9th column, headed "Weather," for "Clo-dy' read "Cloudy."
303	..	In the 5th remark on this page, for "State and W*a*lcott streets" read "State and W*o*lcott streets."
303	31	March 15, 1858, noon. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "56°" read "65°."
304	25	March 20, 1858, 6*h.* 00*m.* p. m. In the 9th column, headed "Weather," for "do." read "Clear."
305	40	March 31, 1858, 8*h.* 00*m.* a. m. In the 8th column, headed "Strength of wind," for "Fresh" read "Gentle."
307	51	In the 1st column, headed "Date, (civil account,)" insert the number "16."
307	..	Bottom line. In the 5th column, headed "Barometer, in inches and decimals," for "9.448" read "29.448."
307	..	Bottom line. In the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for "94°.5" read "64°.5."
308	33	April 21, 1858, 3*h.* 00*m.* p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "63°.3" read "66°.3."
309	17	April 23, 1858, 6*h.* 00*m.* p. m. In the 10th column, headed "Clouds," for "stratus 8" read "stratus 10."
309	20–21	April 24, 1858, noon. In the 10th column, headed "Clouds," for "Cu. str. E. 9" read "Cu. str. E. and stratus west, 8."
309	41	April 27, 1858, 3*h.* 00*m.* p. m In the 9th column, headed "Weather," for "do." read "Clear."
311	19	May 8, 1858, 9*h.* 00*m.* a. m. In the 9th column, headed "Weather," for "do." read "Foggy and misty."
311	25	May 9, 1858, 9*h.* 00*m.* a. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "46°" read "44°."
312	17	May 15, 1858, 9*h.* 00*m.* a. m. In the 7th column, headed "Wind, course from whence," for "NE." read "NW."
312	20	May 15, 1858, 11*h.* 30*m.* a. m. In the 7th column, headed "Wind, course from whence," for "NW." read "N."
313	..	In the 3d remark on this page, for "*storn*" read "*storm.*"
313	49	May 27, 1858, 3*h.* 00*m.* p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "68°.5" read "63°.5."
314	3	May 29, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h.* 00*m* p. m.," for "06°" read "60°."
314	..	Bottom line. In the 7th column, headed "Wind, course from whence," after the word "by" insert the letter "S.," so as to read "E. by S."
315	31	June 7, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "6*h.* 30*m.* p. m." read "6*h.* 00*m.* p. m."
315	33	June 8, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "9*h.* 40*m.*" read "9*h.* 30*m.*"

Page.	Line from top.	
315	36	June 8, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "3*h*. 36*m*." read "3*h*. 30*m*."
316	18	June 13, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "8*h*. 50*m*. a. m." read "8*h*. 30*m*. a. m."
316	26	June 14, 1858. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "70°.3" read "70°.5."
316	34	June 16, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "9*h*. 15*m*. a. m." read "9*h*. 00*m*. a. m."
320	1	July 5, 1858. In the 2d column, headed "Time of observation, (civil account,)" after "6*h*. 00*m*." insert the letters "p. m.," so as to read "6*h*. 00*m*. p. m."
327	46	August 20, 1858, 9*h*. 05*m*. a. m. In the 7th column, headed "Wind, course from whence," for "W." read "W.SW."
329	25	August 29, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "10*h*. 0*m*." read "10*h*. 40*m*."
329	38–39	August 31, 1858, 8*h*. 00*m*. a. m. In the 10th column, headed "Clouds," strike out the observation "Cir. cu. str. 4."
329	40	August 31, 1858, 9*h*. 20*m*. a. m. In the 10th column, headed "Clouds," for "Cirrus 4" read "Cir. cu. str. 4."
329	41	August 31, 1858, noon. In the 10th column, headed "Clouds," insert the observation "Cirrus 4."
329	44	August 31, 1858, 5*h*. 50*m*. p. m. In the 10th column, headed "Clouds," strike out the observation "Cir. cu. str."
329	45	August 31, 1858, 6*h*. 00*m*. p. m. In the 10th column, headed "Clouds," insert the observation "Cir. cu. str."
329	45	August 31, 1858. In the 12th column, headed "Temperature of the external air, (Fahrenheit,) 5*h*. 00*m*. a. m.," strike out the observation "60°."
329	45	August 31, 1858. In the 13th column, headed "Temperature of the external air, (Fahrenheit,) 6*h*. 00*m*. a. m.," strike out the observation "61°."
329	45	August 31, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 10*h*. 00*m*. p. m.," strike out the observation "64°."
329	46	September 1, 1858. In the 12th, 13th, and 14th columns, headed "Temperature of the external air, (Fahrenheit,) 5*h*. a. m., 6*h*. a. m., 10*h*. p. m.," insert the observations "60°," "61°," "64°."
330	3	September 2, 1858, 3*h*. 00*m*. p. m. In the 4th column, headed, "Temperature of the external air, (Fahrenheit,)" for "74°" read "74°.5."
331	17	September 8, 1858, noon. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "80°.8" read "80°."
334	11	September 24, 1858, 11*h*. 40*m*. a. m. In the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for "58°.5" read "68°.5."
336	..	3d line from bottom, October 6, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "4*h* 25*m*. p. m." read "4*h*. 45*m*. p. m."
337	..	In the 3d remark on this page. After the last letter in this remark place the letters "*ay*," so as to read "heavy dead sea rolling all this *day*."

Page.	Line from top.	
337	23	October 9, 1858, 5*h*. 30*m*. p. m. In the 8th column, headed "Wind, strength," for "*no*." read "do."
339	11	October 19, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "6*h*. 25*m*. a. m." read "9*h*. 25*m*. a. m."
340	9	October 25, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "2*h*. 03*m*. p. m." read "2*h*. 37*m*. p. m."
342	20	November 3, 1858, 3*h*. 00*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "21°.8" read "51°.8."
342	..	In the 10th remark on this page, for "*northeart*" read "*northeast*."
343	2	November 6, 1858, 8*h*. 09*m*. a. m. In the 5th column, headed "Barometer, in inches and decimals," for "59.286" read "29.286."
343	8	November 6, 1858, 6*h*. 00*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "42°.5" "read "41°.5."
343	9	November 7, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 6*h*. 00*m*. p. m.," insert the observation "42°."
343	..	In the 2d remark on this page, for "*north ide*" read "*north side*."
343	16	November 8, 1858, noon. In the 5th column, headed "Barometer, in inches and decimals," for "22.469" read "29.469."
343	32	November 10, 1858, noon. In the 5th column, headed "Barometer, in inches and decimals," for "99.471" read "29.471."
344	8	November 14, 1858. In the 14th column, headed "Temperature of the external air, (Fahrenheit,) 6*h*. 00*m*. p. m.," insert observation "29°."
344	..	Bottom line, November 18, 1858, 8*h*. 00*m*. a. m. In the 10th column, headed "Clouds," for "S*rr*atus 10" read "S*tr*atus 10."
345	..	In the 2d remark on this page, for "Take" read "Lake."
345	23	November 20, 1858, 3*h*. 45*m*. p. m. In the 9th column, headed "Weather," for "da." read "do."
345	..	In the 12th remark on this page, for "*tolerable* rough" read "*tolerably* rough."
346	6	November 25, 1858, 9*h*. 00*m*. a. m. In the 5th column, headed "Barometer, in inches and decimals," for "29.661" read "29.691."
346	..	Bottom line, November 28, 1858, 11*h*. 30*m*. a. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" for "34°.8" read "36°.8."
347	1	November 28, 1858. In the 2d column, headed "Time of observation, (civil account,)" strke out the word "Noon."
347	1	November 28, 1858. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" strike out the observation "40°."
347	2	November 28, 1858, 1*h*. 10*m*. p. m. In the 4th column, headed "Temperature of the external air, (Fahrenheit,)" insert "38°."
347	4	In the 1st column, headed "Date, (civil account,)" insert the number "29."

Page.	Line from top.	
347	9	November 29, 1858, 3*h*. 00*m*. p. m. In the 5th column, headed "Barometer, in inches and decimals," for "29.23" read "29.236."
348	19	December 6, 1858, 8*h*. 00*m*. a. m. In the 5th column, headed "Barometer, in inches and decimals," for "39.656" read "29.656."
351	1	December 17, 1858, 9*h*. 00*m*. a. m. In the 11th column, headed "Height of lake surface, as per tide-gauge, in feet and decimals," for "4.17" read "4.07."
351	15	December 19, 1858, noon. In the 5th column, headed "Barometer, in inches and decimals," for "29.493" read "29.403."
351	37	December 22, 1858, 9*h*. 50*m*. a. m. In the 9th column, headed "Weather," for "Clear" read "Cloudy."
351	37	December 22, 1858. In the 12th, 13th, 14th, and 15th columns, headed "Temperature of the external air, (Fahrenheit,) 5*h*. a. m., 6*h*. a. m., 6*h*. p. m., and 10*h*. p. m.," strike out observations "21°, 22°, 33°, 33°," and insert in the stead of, "20°, 20°, 32°, 31°."
352	14	December 24, 1858. In the 2d column, headed "Time of observation, (civil account,)" for "3*h*. 00*m*. a. m." read "3*h*. 00*m*. p. m."
353	3	December 28, 1858, 9*h*. 00*m*. a. m. In the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for "27°" read "72°."
353	14	December 29, 1858, 6*h*. 00*m*. p. m. In the 6th column, headed "Temperature of the mercury in the barometer, (Fahrenheit,)" for "70°.5" read "77°.5."
353	15	December 30, 1858, 8*h*. 00*m*. a. m. In the 3d column, headed "Moon's phases and position," strike out the letter "s."
353	16	December 30, 1858, 8*h*. 20*m*. a. m. In the 3d column, headed "Moon's phases and position," insert the letter "s."
353	18	December 30, 1858, 9*h*. 00*m*. a. m. In the 5th column, headed "Barometer, in inches and decimals," for "19.054" read "29.054."
354	1	For "service" read "surface."
354	24	June 20, 1858, 8*h*. 45*m*. a. m. In the 3d column, headed "Readings of tide-gauge," in feet and decimals, for "4.40" read "4.30."
354	42	July 16, 1858. In the 4th column, headed "Mean solar time of observation," for "11*h*. 30*m*. a. m." read "11*h*. 31*m*. a. m."
362	36	In the 2d column, headed "Average above 0 (zero) of tide-gauge," in feet and decimals, for "2.22" read "3.22."
363	5	In the 4th column, headed "Minima above 0 (zero) of tide-gauge," in feet and decimals, for "2.58" read "2.55."

TABLE H 5.

Investigation of the problem of a lunar tide on Lake Michigan, half-hourly (and in two places quarter-hourly) observations of the elevation of the surface of Lake Michigan made upon a permanent tide-gauge at Chicago, Illinois, from January 1 *to June* 30, 1859, *inclusive.*

NOTE.—The observations are quarter-hourly from 0*h.* 30*m.* to 1*h.* 30*m.* after the moon's meridian transit.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIME PRECEDING THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.											Moon in meridian.
	5*h.* 30*m.*	5*h.* 00*m.*	4*h.* 30*m.*	4*h.* 00*m.*	3*h.* 30*m.*	3*h.* 00*m.*	2*h.* 30*m.*	2*h.* 00*m.*	1*h.* 30*m.*	1*h.* 00*m.*	0*h.* 30*m.*	0
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
December, 1858.												
U.—31st, 22*h.* 03*m.*	....	....	....	....	....	....	....	....	....	....	....	3.260
January, 1859.												
L.—1st, 10*h.* 25*m.*	3.365	3.428	3.373	3.377	3.413	3.455	3.377	3.360	3.393	3.417	3.464	3.490
U.—1st, 22 52	3.435	3.411	3.378	3.301	3.361	3.329	3.393	3.405	3.356	3.377	3.383	3.400
L.—2d, 11 17	3.143	3.189	3.146	3.120	3.109	3.094	3.084	3.063	2.993	2.944	3.002	3.110
U.—2d, 23 43	3.063	3.089	3.074	3.010	2.974	2.887	2.948	3.089	3.113	3.169	3.211	3.230
L.—3d, 12 08	2.677	3.032	3.125	3.151	3.191	3.221	3.261	3.275	3.280	3.311	3.340	3.410
U.—4th, 00 33	3.124	3.180	3.200	3.210	3.122	3.170	3.284	3.256	3.310	3.374	3.340	3.250
L.—4th, 12 57	2.738	2.732	2.760	2.838	2.846	2.738	2.832	2.830	2.876	2.931	2.908	2.910
U.—5th, 01 20	2.993	2.973	2.935	2.910	2.907	2.923	2.987	3.133	3.163	3.227	3.283	3.340
L.—5th, 13 44	3.188	3.267	3.325	3.344	3.360	3.369	3.375	3.375	3.368	3.369	3.309	3.430
U.—6th, 02 05	3.295	3.359	3.352	3.358	3.362	3.433	3.492	3.458	3.520	3.540	3.547	3.600
L.—6th, 14 27	3.652	3.632	3.630	3.612	2.619	3.602	3.618	3.674	3.734	3.785	3.814	3.960
U.—7th, 02 48	3.708	3.673	3.692	3.718	3.724	3.696	3.686	3.714	3.712	3.712	3.731	3.690
L.—7th, 15 10	3.477	3.477	3.483	3.467	3.450	3.437	3.440	3.413	3.397	3.377	3.357	3.350
U.—8th, 03 30	3.230	3.220	3.200	3.210	3.240	3.250	3.250	3.230	3.240	3.260	3.270	3.290
L.—8th, 15 50	3.110	3.147	3.147	3.167	3.213	3.263	3.300	3.323	3.323	3.360	3.400	3.437
U.—9th, 04 10	3.543	3.567	3.553	3.537	3.533	3.553	3.590	3.617	3.627	3.630	3.667	3.720
L.—9th, 16 30	3.480	3.440	3.450	3.490	3.510	3.510	3.500	3.520	3.550	3.510	3.500	3.440
U.—10th, 04 52	2.957	2.845	2.619	2.837	2.862	2.737	2.793	2.894	2.881	2.825	2.849	2.880
L.—10th, 17 13	2.996	2.977	2.960	2.969	2.976	2.979	3.007	3.039	3.076	3.127	3.163	3.220
U.—11th, 05 35	3.125	3.220	3.315	3.293	3.320	3.378	3.405	3.310	3.245	3.245	3.140	3.290
L.—11th, 17 57	3.183	3.217	3.247	3.259	3.287	3.326	3.366	3.368	3.417	3.411	3.428	3.460
U.—12th, 06 21	2.945	2.854	2.842	2.898	3.050	3.090	3.057	2.974	3.013	3.089	3.107	3.050
L.—12th, 18 45	2.973	3.030	3.105	3.136	3.155	3.180	3.210	3.235	3.255	3.275	3.310	3.300

U.—13th, 07	12	3.218	3.168	3.268	3.338	3.306	3.321	3.310	3.144	3.266	3.394	3.472	3.500
L.—13th, 19	40	3.133	3.085	3.053	3.100	3.170	3.250	3.297	3.337	3.413	3.483	3.543	3.550
U.—14th, 08	10	3.707	3.713	3.693	3.758	3.794	3.787	3.840	3.913	4.007	4.090	4.167	4.220
L.—14th, 20	40	4.213	4.197	4.177	4.143	4.120	4.087	4.053	4.010	3.920	3.873	3.897	3.920
U.—15th, 09	12	3.528	3.480	3.472	3.436	3.408	3.432	3.458	3.490	3.532	3.558	3.582	3.620
L.—15th, 21	45	3.085	3.040	2.982	2.905	2.845	2.810	2.785	2.760	2.730	2.700	2.710	2.880
U.—16th, 10	18	3.154	3.120	3.136	3.172	3.186	3.208	3.232	3.282	3.264	3.442	3.542	3.620
L.—16th, 22	52	3.759	3.703	3.631	3.654	3.618	3.706	3.745	3.779	3.796	3.809	3.801	3.770
U.—17th, 11	25	3.477	3.477	3.507	3.517	3.517	3.577	3.600	3.623	3.650	3.667	3.677	3.680
L.—17th, 23	58	3.047	2.958	2.883	2.899	2.859	2.825	2.820	2.814	2.804	2.787	2.827	2.790
U.—18th, 12	30	2.450	2.420	2.450	2.430	2.440	2.490	2.530	2.550	2.590	2.630	2.680	2.720
L.—19th, 01	00	2.490	2.580	2.570	2.600	2.630	2.620	2.630	2.630	2.650	2.780	2.790	2.860
U.—19th, 13	28	2.849	2.859	2.889	2.910	2.937	2.950	2.987	3.009	2.981	2.973	2.961	2.930
L.—20th, 01	55	2.609	2.640	2.720	2.800	2.880	2.913	2.943	2.930	2.957	3.070	3.017	3.070
U.—20th, 14	21	2.898	2.917	2.941	2.929	2.934	2.947	2.964	2.984	3.011	3.013	3.017	3.030
L.—21st, 02	47	2.943	2.983	2.856	2.936	2.869	2.975	3.061	3.015	3.024	3.103	3.075	3.110
U.—21st, 15	10	2.803	2.917	3.013	3.077	3.050	3.120	3.207	3.230	3.160	3.167	3.230	3.230
L.—22d, 03	35	2.877	3.918	2.973	3.032	2.995	3.023	3.045	3.080	3.133	3.155	3.171	3.190
U.—22d, 15	58	2.835	2.867	2.917	2.981	3.046	3.013	3.038	3.096	3.147	3.187	3.143	3.180
L.—23d, 04	20	2.293	2.283	2.283	2.350	2.433	2.513	2.487	2.373	2.290	2.290	2.313	2.380
U.—23d, 16	45	2.399	2.445	2.430	2.435	2.470	2.495	2.515	2.540	2.555	2.540	2.510	2.450
L.—24th, 05	07	2.221	2.302	2.366	2.459	2.502	2.554	2.605	2.627	2.636	2.595	2.594	2.520
U.—24th, 17	30	2.350	2.280	2.310	2.360	2.390	2.380	2.440	2.490	2.480	2.550	2.670	2.750
L.—25th, 05	54	2.986	2.982	2.948	2.988	3.048	3.064	3.114	3.120	3.128	3.146	3.206	3.160
U.—25th, 18	17	2.881	2.885	2.891	2.911	3.937	2.9 6	2.977	2.979	2.993	3.033	3.073	3.130
L.—26th, 06	40	3.193	3.200	3.193	3.187	3.203	3.227	3.273	3.316	3.323	3.337	3.357	3.370
U.—26th, 19	05	3.292	3.303	3.320	3.327	3.312	3.327	3.365	3.397	3.438	3.492	3.558	3.610
L.—27th, 07	30	3.430	3.420	3.450	3.450	3.390	3.400	3.390	3.420	3.360	3.390	3.290	3.240
U.—27th, 19	55	2.883	2.845	2.815	2.823	2.863	2.920	2.972	3.038	3.083	3.148	3.218	3.180
L.—28th, 08	20	2.893	2.920	2.957	3.043	3.140	3.137	3.167	3.157	3.133	3.177	3.260	3.260
U.—28th, 20	48	3.080	3.042	3.006	3.016	2.992	2.986	3.020	3.070	3.102	3.098	3.096	3.120
L.—29th, 09	13	2.983	3.022	3.046	3.062	3.077	3.043	3.029	3.036	3.052	3.063	3.031	3.010
U.—29th, 21	38	2.865	2.885	2.892	2.877	2.905	2.925	2.953	3.001	3.033	3.045	3.076	3.200
L.—30th, 10	05	3.090	3.077	3.087	3.107	3.137	3.147	3.193	3.183	3.137	3.113	3.140	3.170
U.—30th, 22	30	3.200	3.160	3.200	3.130	3.060	2.970	2.951	2.890	2.870	2.890	2.900	3.040
L.—31st, 10	53	3.031	2.989	2.989	2.972	3.049	3.069	2.979	3.043	3.016	3.081	3.104	3.040
U.—31st, 23	18	3.196	3.154	3.114	3.126	3.234	3.194	3.180	3.174	3.200	3.196	3.280	3.390
February, 1859.													
L.—1st, 11	39	3.354	3.398	3.442	3.416	3.412	3.414	3.392	3.422	3.504	3.466	3.432	3.510
U.—2d, 00	02	3.384	3.432	3.485	3.544	3.620	3.639	3.655	3.741	3.779	3.777	3.773	3.850
L.—2d, 12	24	3.738	3.722	3.703	3.752	3.740	3.678	3.718	3.720	3.706	3.672	3.684	3.630
U.—3d, 00	46	3.573	3.629	3.603	3.631	3.619	3.631	3.651	3.669	3.677	3.651	3.671	3.660
L.—3d, 13	07	3.538	3.523	3.505	3.522	3.535	3.557	3.575	3.567	3.599	3.632	3.645	3.650
U.—4th, 01	28	3.521	3.501	3.481	3.461	3.451	3.422	3.439	3.425	3.447	3.423	3.413	3.370
L.—4th, 13	48	3.234	3.226	3.226	3.192	3.232	3.256	3.214	3.244	3.196	3.208	3.258	3.310
U.—5th, 02	09	3.282	3.210	3.162	3.248	3.270	3.282	3.354	3.428	3.448	3.438	3.436	3.470
L.—5th, 14	29	3.381	3.401	3.408	3.439	3.458	3.508	3.539	3.541	3.559	3.552	3.559	3.530
U.—6th, 02	50	3.400	3.420	3.410	3.393	3.377	3.363	3.363	3.373	3.397	3.397	3.473	3.470
L.—6th, 15	11	3.285	3.303	3.327	3.310	3.305	3.307	3.331	3.346	3.340	3.344	3.339	3.300
U.—7th, 03	32	2.882	2.913	2.959	2.949	2.938	2.911	2.928	2.902	2.929	2.922	2.950	2.970
L.—7th, 15	54	2.858	2.894	2.924	2.946	2.958	2.944	2.972	2.956	2.966	2.962	2.960	2.940

TABLE H 5—Continued.

Investigation of the problem of a lunar tide on Lake Michigan, half-hourly (and in two places quarter-hourly) observations of the elevation of the surface of Lake Michigan made upon a permanent tide-gauge at Chicago, Illinois, from January 1 *to June* 30, 1859, *inclusive.*

NOTE.—The observations are quarter hourly from 0*h*. 30*m*. to 1*h*. 30*m*. after the moon's meridian transit.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIME AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.															Moon's age at time of meridian transit.			Moon's apparent declination at time of her meridian transit. U., upper; L., lower. + north; — south.			Sun's apparent declination at time of moon's meridian transit. + N. — S.	
	0*h*. 30*m*	0*h*. 45*m*.	1*h*. 00*m*.	1*h*. 15*m*	1*h*. 30*m*	2*h*. 00*m*.	2*h*. 30*m*	3*h*. 00*m*	3*h*. 30*m*.	4*h*. 00*m*.	4*h* 30*m*	5*h*. 00*m*	5*h*. 30*m*.	6*h*. 00*m*.	6*h*. 30*m*								
	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	*d.*	*h.*	*m*		°	′	°	′
December, 1858.																							
U.—31st, 22*h*. 03*m*.	3.317	3.302	3.290	3.321	3 354	3.391	3.396	3.356	3.336	3.485	3.479	3.379	3.369	3 358	3.343	27	06	55	U.	—27	19	—23	01
January, 1859.																							
L.—1st, 10*h*. 25*m*.	3 427	3.353	3.268	3.283	3.348	3.395	3.417	3.445	3.458	3.410	3.400	3.392	3.448	3.427	3.420	27	19	19	L.	27	50	22	59
U.—1st, 22 52	3.341	3.365	3.440	3.443	3.363	3.445	3.453	3.389	3.423	3 423	3.319	3.268	3.223	3.232	3.091	28	07	44	U.	28	00	22	56
L.—2d, 11 17 .	3.151	3.162	3 177	3.192	3.207	3.231	3.240	3.195	3.120	3.056	3.002	2.986	3.013	3.030	3.041	28	20	09	L.	27	50	22	54
U.—2d, 23 43 .	3.214	3.219	3.250	3.285	3.312	3.356	3.383	3.325	3.289	3.422	2.208	2 189	2 191	2.197	2.367	29	08	35	U.	27	19	22	50
L.—3d, 12 08 .	3.501	3.521	3.519	3.505	3.484	3.429	3.405	3.369	3.344	3.309	3.305	3 259	3.245	3.249	3.174	00	00	33	L.	26	27	22	47
U.—4th, 00 33 .	3.264	3 272	3.232	3.204	3.222	3.190	3.076	2.916	3.060	2.954	2.872	2.982	2.784	2.868	2.810	00	12	58	U.	25	18	22	44
L.—4th, 12 57 .	3.026	3.014	3.074	3.074	3.046	3.096	3.128	3.208	3.186	3.206	3.172	3.156	3.126	3.062	3.022	1	01	22	L.	23	47	22	41
U.—5th, 01 20 .	3.327	3.327	3 303	3.300	3.273	3.270	3.230	3.200	3.253	3.213	3.154	3.123	3.117	3.103	3.137	1	13	45	U.	22	06	22	37
L.—5th, 13 44 .	3.419	3.439	3.449	3 459	3.437	3.391	3.370	3.365	3.351	3.331	3.320	3 311	3.319	3.396	3.432	2	02	09	L.	20	07	22	33
U.—6th, 02 05 .	3.740	3.767	3.783	3.800	3.775	3.637	3.633	3.703	3.717	3.707	3.743	3.755	3.725	3.695	3.667	2	14	30	U.	17	55	22	30
L.—6th, 14 27 .	4.077	4.052	4.017	3.978	3.938	3.858	3.778	3.707	3.718	3.657	3.623	3.602	3.600	3.652	3.714	3	02	54	L.	15	33	22	26
U.—7th, 02 48 .	3.630	3.604	3.574	3.553	3.568	3.508	3 478	3.508	3.514	3.522	3.518	3.498	3.490	3.476	3.472	3	15	15	U.	13	16	22	22
L—7th, 15 10 .	3.327	3.352	3.377	3.402	3.413	3.437	3.460	3.433	3.410	3.383	3.350	3.303	3.283	3.260	3.237	4	03	37	L.	10	20	22	18
U.—8th, 03 30 .	3.290	3.265	3.240	3.225	3 210	3.210	3.180	3.160	3 150	3.140	3.170	3.140	3.120	3.090	3.090	4	15	57	U.	7	29	22	14
L.—8th, 15 50 .	3.467	3.482	3.487	3.493	3.503	3 537	3.523	3.483	3.437	3.427	3.443	3.437	3.443	3.457	3.442	5	04	17	L.	4	39	22	09
U.—9th, 04 10 .	3.727	3.707	3 710	3.725	3.723	3.700	3.677	3.660	3.630	3 603	3 590	3.577	3.547	3.530	3.493	5	16	37	U.	— 1	42	22	05
L.—9th, 16 30 .	3.410	3 385	3.360	3.375	3.390	3.450	3.510	3.440	3.360	3.180	3.050	3.000	2.940	2.800	2.920	6	04	57	L.	+ 1	18	22	01
U.—10th, 04 52 .	2.942	2.959	2.979	2.995	3.005	3.039	3.028	2.991	2.965	2.953	2.935	2.959	2.985	3.027	3.009	6	17	19	U.	4	19	21	56
L.—10th, 17 13 .	3.274	3.279	3.271	3.261	3.277	3.274	3.257	3.245	3.174	3.136	3.108	3.102	3.156	3.196	3.155	7	05	40	L.	7	20	21	51
U.—11th, 05 35 .	3.315	3 330	3.333	3.313	3.293	3.253	3.217	3.192	3.147	3.123	3 087	3.075	3.105	3.133	3.153	7	18	02	U.	10	21	21	46
L.—11th, 17 57 .	3.496	3.516	3.536	3.444	3.324	3.172	3.106	2.992	2.971	3 024	2.910	2.848	2.810	2.875	2.907	8	06	24	L.	13	15	21	41
U.—12th, 06 21 .	2.872	2 840	2 865	2.890	2 915	2.944	2 974	3.015	3.009	3.035	3.078	3.069	3.053	3.022	2.996	8	18	48	U.	16	03	21	36
L.—12th, 18 45 .	3.240	3.200	3.220	3.240	3.265	3.305	3.300	3.165	3.090	3.040	3 130	3.250	3.325	3.196	3.210	9	07	12	L.	18	44	21	31

U.—13th,	07	12 .	3.488	3.493	3.390	3.363	3.340	3.282	3.220	3.202	3.193	3.172	3.182	3.158	3.156	3.156	3.132	9	19	39 U.	21	09	21	26
L.—13th,	19	40 .	3.567	3.577	3.597	3.622	3.650	3.720	3.773	3.760	3.757	3.747	3.713	3.666	3.663	3.683	3.680	10	08	07 L.	23	12	21	21
U.—14th,	08	10 .	4.340	4.385	4.377	4.342	4.297	4.247	4.270	4.247	4.250	4.263	4.243	4.220	4.213	4.223	4.173	10	20	37 U.	25	11	21	15
L.—14th,	20	40 .	3.893	3.853	3.890	3.905	3.907	3.890	3.853	3.793	3.743	3.717	3.620	3.573	3.553	3.550	3.567	11	09	07 L.	26	38	21	09
U.—15th,	09	12 .	3.598	3.533	3.488	3.448	3.420	3.382	3.354	3.342	3.352	3.324	3.292	3.256	3.204	3.168	3.134	11	21	39 U.	27	37	21	03
L.—15th,	21	45 .	2.985	3.000	2.996	2.960	2.938	3.100	3.255	3.270	3.215	3.240	3.202	3.200	3.335	3.295	3.196	12	10	12 L.	28	02	20	58
U.—16th,	10	18 .	3.764	3.807	3.842	3.878	3.918	3.988	4.084	4.144	4.142	4.118	4.104	4.064	3.986	3.908	3.838	12	22	45 U.	27	55	20	52
L.—16th,	22	52 .	3.831	3.801	3.752	3.731	3.773	3.822	3.719	3.663	3.627	3.566	3.537	3.411	3.447	3.499	3.509	13	11	19 L.	27	13	20	45
U.—17th,	11	25 .	3.673	3.650	3.620	3.597	3.577	3.537	3.493	3.430	3.367	3.303	3.263	3.220	3.180	3.150	3.127	13	23	52 U.	25	57	20	39
L.—17th,	23	58 .	2.873	2.759	2.783	2.738	2.834	2.692	2.683	2.475	2.368	2.239	2.314	2.332	2.336	2.378	2.416	14	12	25 L.	24	04	20	33
U.—18th,	12	30 .	2.740	2.760	2.770	2.800	2.810	2.810	2.740	2.700	2.640	2.610	2.560	2.540	2.510	2.450	2.440	15	00	57 U.	21	54	20	26
L.—19th,	01	00 .	2.980	2.980	2.890	2.950	2.910	2.910	2.890	2.840	2.830	2.800	2.820	2.800	2.790	2.800	2.830	15	13	27 L.	19	16	20	20
U.—19th,	13	28 .	2.887	2.872	2.857	2.842	2.823	2.888	2.843	2.804	2.773	2.723	2.681	3.644	2.629	2.591	2.597	16	01	55 U.	16	18	20	13
L.—20th,	01	55 .	3.103	3.120	3.137	3.120	3.090	2.873	2.803	2.837	2.877	2.927	2.937	2.907	2.863	2.837	2.853	16	14	22 L.	13	06	20	06
U.—20th,	14	21 .	3.044	3.054	3.064	3.072	3.077	3.080	3.087	3.090	3.104	3.117	3.120	3.050	3.076	3.081	3.020	17	02	48 U.	9	51	20	00
L.—21st,	02	47 .	3.019	2.977	2.957	2.939	2.929	3.011	3.012	2.909	2.893	3.012	3.028	2.923	2.835	2.736	2.725	17	15	14 L.	6	22	19	53
U.—21st,	15	10 .	3.173	3.148	3.130	3.115	3.117	3.113	3.060	3.043	3.100	3.103	3.030	2.943	2.917	2.884	2.857	18	03	37 U.	+ 2	55	19	46
L.—22d,	03	35 .	3.093	3.073	3.063	3.073	3.077	3.055	3.017	2.955	2.970	2.917	2.905	2.923	2.883	2.858	2.890	18	16	02 L.	— 0	31	19	38
U.—22d,	15	58 .	3.171	3.170	3.170	3.153	3.133	3.018	2.945	2.837	2.765	2.676	2.558	2.475	2.395	2.303	2.263	19	04	25 U.	3	46	19	31
L.—23d,	04	20 .	2.397	2.432	2.467	2.472	2.417	2.367	2.373	2.327	2.247	2.260	2.318	2.310	2.327	2.360	2.377	19	16	47 L.	7	07	19	24
U.—23d,	16	45 .	2.365	2.310	2.315	2.290	2.275	2.245	2.195	2.155	2.140	2.135	2.135	2.140	2.126	2.150	2.190	20	05	12 U.	10	14	19	17
L.—24th,	05	07 .	2.454	2.419	2.412	2.437	2.443	2.411	2.375	2.355	2.335	2.332	2.363	2.352	2.369	2.291	2.281	20	17	34 L.	13	09	19	10
U.—24th,	17	30 .	2.810	2.840	2.870	2.925	2.980	3.080	3.040	3.010	3.030	3.000	3.050	3.070	3.010	2.980	2.970	21	05	57 U.	15	54	19	02
L.—25th,	05	54 .	3.052	3.045	3.070	3.074	3.064	3.988	2.954	2.982	2.966	2.944	2.916	2.926	2.906	2.868	2.868	28	18	21 L.	18	26	18	54
U.—25th,	18	17 .	3.173	3.157	3.137	3.119	3.109	3.100	3.094	3.118	3.174	3.206	3.189	3.197	3.221	3.236	3.212	22	06	44 U.	20	42	18	46
L.—26th,	06	40 .	3.380	3.365	3.353	3.343	3.330	3.307	3.310	3.307	3.247	3.227	3.247	3.250	3.237	3.253	3.270	22	19	07 L.	22	42	18	38
U.—26th,	19	05 .	3.618	3.583	3.553	3.533	3.515	3.485	3.457	3.435	3.408	3.400	3.368	3.433	4.452	3.457	3.438	23	07	32 U.	24	25	18	30
L.—27th,	07	30 .	3.210	3.190	3.170	3.180	3.190	3.200	3.180	3.180	3.160	3.130	3.080	3.040	3.010	2.990	2.950	23	19	57 L.	25	49	18	22
U.—27th,	19	55 .	3.167	3.153	3.143	3.127	3.107	3.050	2.998	2.973	2.962	2.977	2.982	2.963	2.860	2.865	2.878	24	08	22 U.	26	54	18	14
L.—28th,	08	20 .	3.203	3.185	8.170	3.164	3.173	3.147	3.117	3.150	3.197	3.223	3.203	3.170	3.173	3.160	3.123	24	20	47 L.	27	38	18	06
U.—28th,	20	48 .	3.134	3.127	3.112	3.096	3.076	3.012	2.962	2.968	3.016	2.943	2.928	2.918	2.934	2.942	2.962	25	09	15 U.	28	02	17	58
L.—29th,	09	13	3.026	3.021	3.033	3.048	3.059	3.057	3.044	3.041	3.030	3.017	2.987	2.974	2.958	2.913	2.877	25	21	40 L.	28	03	17	49
U.—29th,	21	38 .	3.162	3.147	3.132	3.117	3.105	3.114	3.188	3.231	8.274	3.225	3.149	3.111	3.063	3.071	3.075	26	10	05 U.	27	46	17	41
L.—30th,	10	05 .	3.157	3.150	3.157	3.173	3.193	3.220	3.263	3.280	3.253	3.233	3.230	3.273	3.300	3.270	3.230	26	22	32 L.	27	06	17	32
U.—30th,	22	30 .	3.030	3.040	3.040	2.980	3.020	3.060	3.060	3.070	3.060	2.970	2.890	2.870	2.880	2.930	2.930	27	10	57 U.	26	08	17	24
L.—31st,	10	53 .	4.048	3.153	3.229	3.312	......	......	......	......	......	......	......	......	......	......	......	27	23	20 L.	— 24	47	—17	15
......	......	......	......	......	......	......	3.313	3.173	3.237	3.274	3.213	3.188	3.159	3.099	3.116	3.186	3.225	......	......	......	......	......	......	......
U.—31st,	23	18 .	3.424	3.412	3.466	3.480	3.422	3.368	3.324	3.290	3.296	3.314	3.264	3.292	3.326	3.294	3.344	28	11	45 U.	— 23	17	—17	06
February, 1859.																								
L.—1st,	11*h*	39*m*.	3.524	3.570	3.608	3.614	3.622	3.563	3.526	3.482	3.463	3.478	3.518	3.460	3.432	3.468	3.408	29	00	06 L.	21	26	16	57
U.—2d,	00	02 .	3.913	3.927	3.914	3.944	3.964	3.961	3.965	4.032	3.945	3.865	3.814	3.821	3.799	3.806	3.759	29	12	29 U.	19	20	16	48
L.—2d,	12	24 .	3.684	3.706	3.646	3.658	3.668	3.646	3.598	3.558	3.618	3.654	3.622	3.602	3.552	3.524	3.646	0	03	49 L.	17	05	16	39
U.—3d,	00	46 .	3.653	3.621	3.636	3.619	3.639	3.635	3.629	3.604	3.579	3.586	3.589	3.564	3.555	3.571	3.559	0	16	11 U.	14	40	16	30
L.—3d,	13	07 .	3.680	3.680	3.675	3.665	3.653	3.635	3.643	3.615	3.593	3.579	3.598	3.555	3.531	3.507	3.528	1	04	32 L.	12	00	16	21
U.—4th,	01	28 .	3.321	3.303	3.326	3.365	3.344	3.323	3.305	3.327	3.274	3.251	3.221	3.257	3.224	3.183	3.216	1	16	53 U.	9	15	16	12
L.—4th,	13	48 .	3.304	3.318	3.306	3.288	3.274	3.266	3.276	3.286	3.244	3.228	3.236	3.198	3.206	3.248	3.306	2	05	13 L.	6	25	16	03
U.—5th,	02	09 .	3.474	3.452	3.446	3.459	3.438	3.452	3.418	3.412	3.382	3.328	3.350	3.412	3.412	3.381	3.382	2	17	34 U.	3	26	15	53
L.—5th,	14	29 .	3.561	3.511	3.521	3.529	3.510	3.529	3.531	3.491	3.479	3.441	3.459	3.489	3.451	3.411	3.429	3	05	54 L.	— 0	27	15	43
U.—6th,	02	50 .	3.457	3.423	3.400	3.377	3.373	3.413	3.400	3.377	3.377	3.357	3.340	3.323	3.320	3.300	3.307	3	18	15 U.	+ 2	30	15	33
L.—6th,	15	11 .	3.277	3.271	3.274	3.279	3.269	3.246	3.233	3.224	3.219	3.193	3.140	3.022	2.911	2.860	2.867	4	06	35 L.	5	34	15	25
U.—7th,	03	32 .	2.971	2.981	2.969	2.984	2.982	3.011	3.027	2.988	2.959	2.937	2.891	2.907	2.868	2.839	2.823	4	18	57 U.	8	34	15	15
L.—7th,	15	54 .	2.916	2.901	2.886	2.886	2.896	2.924	2.946	2.966	3.010	3.038	3.044	3.008	3.058	3.138	3.150	5	07	19 L.	+ 11	25	—15	06

TABLE H 5—Continued.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIME AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.															Moon's age at time of meridian transit.			Moon's apparent declination at time of her meridian transit U., upper; L., lower. + north; — south.			Sun's apparent declination at time of moon's meridian transit. + N. — S.	
	0h 30m	0h 45m	1h 00m	1h. 15m	1h 30m	2h 00m	2h. 30m	3h. 00m	3h. 30m	4h. 00m	4h 30m	5h 00m	5h 30m	6h. 00m	6h 30m								
	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	d.	h.	m		°	'	°	'
February, 1859.																							
U.—8th, 04h. 17m	3.305	3.269	3.264	3.262	3.277	3.301	3.270	3.195	3.194	3.243	3.243	3.919	3.255	3.324	3.327	5	19	3	U. +	14	18	—14	56
L.—8th, 16 41	3.418	3.443	3.465	3.485	3.516	3.575	3.618	3.643	3.634	3.644	3.639	3.609	3.559	3.536	3.501	6	07	55	L.	17	00	14	46
U.—9th, 05 05	3.357	3.347	3.342	3.347	3.345	3.317	3.302	3.315	3.345	3.373	3.385	3.357	3.335	3.312	3.315	6	20	19	U.	19	32	14	36
L.—9th, 17 31	3.289	3.374	3.359	3.339	3.319	3.292	3.339	3.299	3.269	3.239	3.220	3.251	3.279	3.240	3.239	7	08	45	L.	21	51	14	26
U.—10th, 05 58	3.449	3.463	3.478	3.497	3.517	3.539	3.400	3.343	3.377	3.352	3.322	3.301	3.337	3.312	3.282	7	21	19	U.	23	57	14	14
L.—10th, 18 27	3.373	3.358	3.343	3.316	3.286	3.253	3.223	3.193	3.154	3.150	3.114	3.092	3.072	3.115	3.147	8	09	4[illegible]	L.	25	34	14	05
U.—11th, 06 56	3.337	3.351	3.366	3.385	3.405	3.393	3.416	3.385	3.354	3.324	3.294	3.273	3.279	3.254	3.259	8	22	11	U.	26	56	13	55
L.—11th, 19 28	3.423	3.403	3.383	3.367	3.352	3.331	3.274	3.223	3.229	3.221	3.286	3.299	3.291	3.337	3.265	9	10	41	L.	27	45	13	45
U.—12th, 08 00	3.130	3.115	3.100	3.095	3.090	3.040	3.010	2.990	2.940	3.890	2.910	2.950	2.980	2.930	2.950	9	23	13	U.	28	07	13	34
L.—12th, 20 31	3.201	3.211	3.218	3.193	3.169	3.129	3.102	3.146	3.019	3.984	2.854	2.881	2.898	2.819	2.835	10	11	45	L.	27	58	13	24
U.—13th, 09 03	3.100	3.150	3.198	3.238	3.279	3.359	3.346	3.312	3.325	3.277	3.246	3.213	3.235	3.186	3.148	11	00	18	U.	27	16	13	13
L.—13th, 21 35	2.978	3.003	3.033	3.073	3.103	3.115	3.090	3.100	3.147	3.133	3.145	3.117	3.102	3.113	3.125	11	12	51	L.	26	02	13	03
U.—14th, 10 07	3.262	3.267	3.265	3.255	3.259	3.285	3.272	3.275	3.255	3.235	3.227	3.259	3.295	3.312	3.327	12	01	22	U.	24	19	12	52
L.—14th, 22 37	3.358	3.333	3.308	3.283	3.277	3.288	3.250	3.243	3.215	3.193	3.165	3.145	3.121	3.078	3.045	12	13	52	L.	22	07	12	42
U.—15th, 11 07	3.255	3.265	3.272	3.277	3.251	3.245	3.248	3.217	3.238	3.221	3.185	3.163	3.135	3.120	3.095	13	02	22	U.	19	31	12	31
L.—15th, 23 35	3.233	3.183	3.167	3.187	3.157	3.173	3.097	3.033	3.037	2.917	2.977	3.067	3.070	2.987	2.977	13	14	51	L.	16	21	12	20
U.—16th, 12 03	3.298	3.318	3.274	3.280	3.248	3.252	3.198	3.154	3.112	3.112	3.210	3.194	3.178	3.106	3.112	14	03	18	U.	13	25	12	09
L.—17th, 00 30	3.120	3.100	3.150	3.210	3.220	3.270	3.260	3.230	3.200	3.210	3.200	3.130	3.170	3.140	3.150	14	15	45	L.	10	05	11	58
U.—17th, 12 56	3.327	3.308	3.285	3.243	3.245	3.176	3.187	3.094	3.079	3.078	3.142	3.155	3.172	3.203	3.136	15	04	10	U.	6	37	11	47
L.—18th, 01 20	3.387	3.393	3.387	3.413	3.480	3.543	3.340	3.247	3.317	3.260	3.197	3.260	3.260	3.170	3.133	15	16	3[illegible]	L. +	3	05	11	36
U.—18th, 13 45	3.310	3.290	3.200	3.320	3.290	3.270	3.260	3.200	3.130	3.090	3.080	3.060	3.050	2.940	2.910	16	04	59	U. —	0	24	11	25
L.—19th, 02 09	3.257	3.252	3.258	3.266	3.255	3.214	3.188	3.151	3.127	3.114	3.082	3.043	3.062	3.081	3.019	16	17	23	L.	3	53	11	14
U.—19th, 14 33	2.953	2.968	2.988	3.028	3.061	3.073	3.095	3.046	3.003	2.937	2.904	2.847	2.814	2.928	3.005	17	05	47	U.	7	14	11	03
L.—20th, 02 56	2.888	2.873	2.863	2.919	2.999	3.081	2.960	2.871	2.877	2.828	2.915	2.982	3.068	3.045	3.083	17	18	11	L.	10	24	10	52
U.—20th, 15 20	3.270	3.295	3.310	3.307	3.267	3.193	3.143	3.097	3.027	2.927	2.957	2.950	2.866	2.843	2.850	18	06	35	U.	13	28	10	41
L.—21st, 03 44	2.727	2.702	2.664	2.584	2.552	2.553	2.609	2.649	2.703	2.768	2.791	2.757	2.744	2.727	2.676	18	18	59	L.	16	17	10	30
U.—21st, 16 08	2.993	3.018	3.022	3.007	2.987	2.958	2.967	2.925	2.902	2.869	2.781	2.710	2.702	2.709	2.803	19	07	23	U.	18	51	10	18
L.—22d, 04 33	3.205	3.180	3.158	3.148	3.145	3.184	3.129	3.123	3.149	3.140	3.142	3.162	3.177	3.153	3.182	19	19	47	L.	21	08	10	07
U.—22d, 16 58	3.281	3.271	3.261	3.253	3.251	3.222	3.211	3.266	3.212	3.221	3.211	3.200	3.179	3.226	3.127	20	08	1[illegible]	U.	23	08	9	56
L.—23d, 05 23	3.857	3.891	3.884	3.833	3.768	3.685	3.711	3.663	3.641	3.609	3.586	3.615	3.651	3.657	3.679	20	20	37	L.	24	49	9	44
U.—23d, 17 48	3.879	3.822	3.765	3.718	3.708	3.688	3.668	3.621	3.618	3.656	3.634	3.620	3.610	3.570	3.492	21	09	03	U.	26	10	9	32
L.—24th, 06 14	3.689	3.659	3.728	3.721	3.692	3.643	3.679	3.682	3.669	3.739	3.731	3.709	3.721	3.661	3.698	21	21	31	L.	27	10	9	21
U.—24th, 18 40	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	22	09	59	U.	27	4[illegible]	9	10
L.—25th, 07 06	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	22	22	24	L.	28	06	8	58
U.—25th, 19 32	2.998	3,059	3.127	3.178	3.235	3.3[illegible]5	3.381	3.395	3.3[illegible]2	3.352	3.383	3.417	3.373	3.447	3.402	23	10	50	U.	28	0[illegible]	8	47

L.—26th,	07	57	3.172	3.134	3.089	3.083	3.098	3.136	3.158	3.169	3.125	3.075	3.088	3.063	3.021	3.038	2.995	23	23	16	L.	27	38	8	36
U.—26th,	20	23	3.120	3.136	3.166	3.199	3.234	3.288	3.323	3.299	3.290	3.275	3.229	3.136	3.026	2.977	2.985	24	11	41	U.	26	54	8	24
L.—27th,	08	47	3.073	3.063	3.083	3.098	3.083	3.064	3.049	3.057	3.059	3.010	2.963	2.973	2.984	2.994	3.019	25	00	06	L.	25	45	8	12
U.—27th,	21	12	3.320	3.295	3.270	3.245	3.218	3.194	3.166	3.184	3.192	3.118	3.014	2.904	2.818	2.778	2.822	25	12	30	U.	24	28	8	00
L.—28th,	09	35	3.157	3.177	3.180	3.150	3.142	3.215	......	......	......	......	......	......	......	......	......	26	00	54	L.	— 22	49	— 7	46
......	......	......	......	......	......	......	......	......	3.285	3.257	3.232	3.197	3.232	3.233	3.212	3.283	3.347	......	......	......	......	......	......	......	......
U.—28th,	21	59	3.329	3.330	3.330	3.363	3.398	3.448	3.518	3.501	3.461	3.412	3.371	3.338	3.301	3.271	3.260	26	13	17	U.	— 20	54	— 7	36
March, 1859.																									
L.—1st,	10*h*.	21*m*.	3.405	3.414	3.399	3.380	3.355	3.319	3.338	3.329	3.299	3.297	3.272	3.295	3.338	3.294	3.249	27	01	40	L.	18	46	7	23
U.—1st,	22	43	3.329	3.339	3.323	3.303	3.322	3.337	3.320	3.311	3.313	3.321	3.306	3.300	3.294	3.349	3.337	27	14	02	U.	16	27	7	11
L.—2d,	11	04	3.547	3.537	3.534	3.549	3.569	3.646	3.745	3.695	3.603	3.608	3.527	3.515	3.541	3.476	3.442	28	02	23	L.	13	54	7	00
U.—2d,	23	26	3.266	3.263	3.253	3.239	3.224	3.246	3.233	3.270	3.314	3.261	3.136	3.078	2.963	3.039	3.077	28	14	45	U.	11	15	6	49
L.—3d,	11	47	2.959	2.959	3.025	3.071	3.136	3.086	3.067	3.015	2.987	3.005	2.925	2.924	2.954	2.879	2.836	29	03	05	L.	8	24	6	38
U.—4th,	00	09	3.078	3.148	3.194	3.118	3.100	3.182	3.112	3.038	3.030	2.982	3.050	3.118	3.082	3.038	3.048	29	15	29	U.	5	29	6	27
L.—4th,	12	30	3.200	3.180	3.210	3.190	3.150	3.230	3.190	3.140	3.120	3.130	3.100	3.150	3.090	3.090	3.020	0	11	10	L.	— 2	30	6	15
U.—5th,	00	50	3.213	3.190	3.160	3.140	3.133	3.107	3.097	3.060	3.017	3.027	3.033	3.047	3.057	3.073	3.090	0	23	30	U.	+ 0	33	6	02
L.—5th,	13	10	3.310	3.323	3.303	3.303	3.337	3.307	3.313	3.247	3.283	3.250	3.227	3.250	3.210	3.200	3.230	1	11	50	L.	3	35	5	50
U.—6th,	01	31	3.517	3.478	3.447	3.401	3.419	3.419	3.331	3.431	3.423	3.428	3.372	3.422	3.428	3.432	3.478	2	00	10	U.	6	38	5	38
L.—6th,	13	53	3.392	3.375	3.365	3.376	3.406	3.443	3.435	3.463	3.503	3.502	3.531	3.548	3.519	3.525	3.499	2	12	35	L.	9	39	5	26
U.—7th,	02	15	3.810	3.840	3.920	4.000	3.945	3.810	3.750	3.830	3.855	3.745	3.640	3.630	3.625	3.580	3.575	3	01	00	U.	12	33	5	14
L.—7th,	14	40	3.577	3.557	3.537	3.517	3.547	3.637	3.653	3.680	3.760	3.830	3.863	3.753	3.627	3.600	3.590	3	13	20	L.	15	22	5	02
U.—8th,	03	03	3.315	3.240	3.177	3.162	3.158	3.237	3.296	3.257	3.228	3.212	3.231	3.237	3.206	3.173	3.200	4	01	45	U.	18	01	4	50
L.—8th,	15	30	3.290	3.270	3.250	3.235	3.220	3.230	3.200	3.140	3.100	3.120	3.090	3.080	3.100	3.080	3.110	4	14	10	L.	20	27	4	38
U.—9th,	03	55	3.290	3.240	3.150	3.093	3.053	3.015	3.018	2.987	2.988	3.015	3.045	3.075	3.038	3.063	3.112	5	02	35	U.	22	38	4	26
L.—9th,	16	22	3.368	3.369	3.389	3.400	3.400	3.378	3.355	3.299	3.309	3.305	3.285	3.328	3.296	3.199	3.155	5	15	00	L.	24	32	4	13
U.—10th,	04	50	3.460	3.442	3.417	3.402	3.407	3.397	3.410	3.420	3.407	3.393	3.370	3.360	3.327	3.323	3.357	6	03	30	U.	26	04	4	01
L.—10th,	17	20	3.560	3.497	3.457	3.427	3.417	3.457	3.493	3.360	3.523	3.553	3.440	3.480	3.443	3.410	3.300	6	16	00	L.	27	12	3	47
U.—11th,	05	50	2.850	2.858	2.913	2.928	2.863	2.740	2.640	2.663	2.783	2.937	3.063	3.149	2.950	2.873	2.757	7	04	30	U.	27	53	3	36
L.—11th,	18	21	2.768	2.732	2.687	2.670	2.695	2.738	2.771	2.654	2.514	2.464	2.618	2.774	2.915	3.016	3.082	7	17	00	L.	28	06	3	24
U.—12th,	06	53	3.202	3.201	3.221	3.233	3.238	3.255	3.260	3.215	3.217	3.218	3.189	3.142	3.153	3.160	3.129	8	05	35	U.	27	48	3	12
L.—12th,	19	24	3.194	3.200	3.200	3.194	3.184	3.193	3.176	3.146	3.124	3.040	3.036	3.064	3.102	3.118	3.136	8	18	05	L.	27	00	3	00
U.—13th,	07	55	3.692	3.693	3.683	3.690	3.705	3.752	3.783	3.823	3.763	3.725	3.662	3.608	3.533	3.528	3.505	9	06	35	U.	25	43	2	47
L.—13th,	20	25	3.631	3.613	3.588	3.560	3.530	3.470	3.402	3.332	3.303	3.267	3.202	3.345	3.353	3.190	2.960	9	19	05	L.	24	07	2	35
U.—14th,	08	54	3.062	2.974	2.864	2.862	2.932	2.872	2.861	2.874	2.887	3.034	2.870	2.732	2.646	2.678	2.746	10	07	35	U.	21	47	2	23
L.—14th,	21	22	3.375	3.354	3.384	3.412	3.437	3.465	3.441	3.445	3.428	3.383	3.289	3.216	3.042	3.057	3.092	10	29	00	L.	19	18	2	11
U.—15th,	09	50	3.397	3.382	3.357	3.342	3.347	3.297	3.237	3.207	3.173	3.100	3.077	3.040	2.980	2.973	2.987	11	04	30	U.	16	25	1	59
L.—15th,	22	15	3.085	3.100	3.060	3.020	2.980	2.965	3.045	3.070	3.050	3.043	3.025	3.000	2.973	2.965	2.920	11	20	55	L.	13	22	1	46
U.—16th,	10	42	3.276	3.246	3.261	3.285	3.262	3.204	3.200	3.210	3.156	3.088	3.056	3.092	3.106	3.084	3.036	12	09	20	U.	10	07	1	33
L.—16th,	23	08	3.411	3.431	3.453	3.478	3.490	3.479	3.445	3.430	3.422	3.392	3.365	3.348	3.361	3.413	3.491	12	21	50	L.	6	40	1	22
U.—17th,	11	33	......	......	......	......	......	......	......	......	......	......	......	......	......	......	......	13	10	10	U.	+ 3	12	1	10
L.—17th,	23	57	......	......	......	......	......	......	......	......	......	3.597	3.551	......	......	......	3.560	13	22	35	L.	— 0	26	0	56
U.—18th,	12	20	3.563	3.581	3.553	3.536	3.498	3.427	3.347	3.293	3.253	3.180	3.090	3.053	3.043	3.090	3.090	14	10	55	U.	3	45	0	45
L.—19th,	00	45	3.290	3.230	3.120	3.100	3.210	3.150	3.100	3.000	3.000	3.000	2.830	2.930	3.070	2.990	2.920	14	23	20	L.	7	08	0	32
U.—19th,	13	09	3.102	3.984	3.093	3.122	3.112	3.120	3.066	3.072	3.086	3.038	3.006	2.982	3.013	2.978	3.024	15	11	50	U.	10	24	0	20
L.—20th,	01	33	3.308	3.330	3.286	3.280	3.316	3.318	3.221	3.208	3.226	3.236	3.274	3.216	3.156	3.115	3.061	16	00	10	L.	13	25	— 0	07
U.—20th,	13	58	3.417	3.429	3.439	3.427	3.412	3.373	3.389	3.362	3.341	3.303	3.272	3.256	3.205	3.181	3.133	16	12	35	U.	16	18	+ 0	05
L.—21st,	02	22	3.411	3.405	3.415	3.406	3.376	3.331	3.320	3.298	3.275	3..33	3.213	3.217	3.235	3.240	3.269	17	01	00	L.	18	53	0	17
U.—21st,	14	46	3.601	3.611	3.621	3.631	3.641	3.645	3.640	3.624	3.573	3.476	3.383	3.301	3.290	3.279	3.265	17	13	25	U.	21	12	0	29
L.—22d,	03	12	3.496	3.476	3.432	3.397	3.339	3.236	3.168	3.112	3.130	3.138	3.128	3.148	3.148	3.138	3.154	18	01	50	L.	23	13	0	41
U.—22d,	15	39	3.399	3.414	3.405	3.380	3.361	3.355	3.387	3.362	3.317	3.310	3.301	3.312	3.349	3.385	3.420	18	14	20	U.	24	54	0	53
L.—23d,	04	05	3.722	3.697	3.667	3.627	3.595	3.538	3.492	3.462	3.522	3.512	3.417	3.395	3.367	3.332	3.233	19	02	45	L.	26	14	1	06
U.—23d,	16	30	3.210	3.225	3.210	3.205	3.200	3.150	2.990	3.000	3.030	2.980	3.050	3.080	3.110	3.030	3.040	19	15	10	U.	— 27	12	+ 1	[illegible]

TABLE H 5—Continued.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIME PRECEDING THE MOON'S MERIDIAN TRANSIT AND READING OF TIDE-GAUGE.											Moon in meridian.
	5h. 30m.	5h. 00m.	4h. 30m.	4h. 00m.	3h. 30m.	3h. 00m.	2h. 30m.	2h. 00m.	1h. 30m.	1h. 00m.	0h. 30m.	0
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
March 1859.												
L.—24th, 04h. 57m	3.004	2.938	2.938	2.931	2.966	2.988	3.017	2.984	2.953	2.941	2.988	2.400
U.—24th, 17 24	3.004	3.076	3.114	3.168	3.156	3.134	3.138	3.172	3.348	3.494	3.568	3.630
L.—25th, 05 50	3.320	3.323	3.350	3.340	3.307	3.337	3.4 3	3.427	3.417	3.407	3.430	3.450
U.—25th, 18 15	3.320	3.390	3.390	3.400	3.420	3.390	3.410	3.320	3.380	3.440	3.360	3.410
L.—26th, 06 40	3.403	3.400	3.330	3.360	3.203	3.360	3.667	3.440	3.480	3.537	3.480	3.649
U.—26th, 19 05	3.447	3.470	3.550	3.630	3.733	3.663	3.653	3.763	3.807	3.707	3.653	3.600
L.—27th, 07 30	3.790	3.800	3.730	3.700	4.100	3.730	3.560	3.700	4.020	3.830	3.760	3.719
U.—27th, 19 54	....	4.028	3.938	4.162	4.098	3.950	3.856	3.960	4.038	3.898	3.972	4.100
L.—28th, 08 16	4.001	3.790	3.784	3.867	3.986	4.150	4.252	4.216	4.069	4.013	4.111	4.200
U.—28th, 20 39	....	....	....	....	....	....	....	....	....	....	....	....
L.—29th, 09 01	....	....	....	....	....	....	....	....	....	....	....	3.460
U.—29th, 21 23	3.285	3.273	3.234	3.243	3.281	3.267	3.245	3.202	3.159	3.104	3.113	3.060
L.—30th, 09 45	3.055	3.105	3.115	3.075	3.080	3.120	3.165	3.200	3.220	3.215	3.210	3.200
U.—30th, 22 05	3.445	3.405	3.340	3.387	3.362	3.313	3.267	3.193	3.157	3.155	3.242	3.330
L.—31st, 10 25	3.100	3.065	3.093	3.117	3.072	3.042	3.082	3.157	3.212	3.195	3.223	3.250
U.—31st, 22 45	3.195	3.185	3.195	3.240	3.420	3.500	3.440	3.545	3.650	3.700	3.745	3.780
April, 1859.												
L.—1st, 11 06	3.912	3.986	3.914	3.856	3.896	3.966	4.000	4.034	4.020	4.042	3.994	4.111
U.—1st, 23 28	3.906	3.863	3.785	3.808	3.978	4.279	4.375	4.427	4.505	4.538	4.314	4.050
L.—2d, 11 50	3.396	3.520	3.560	3.293	3.203	3.387	3.363	3.313	2.977	2.983	2.800	3.180
U.—3d, 00 11	3.528	3.563	3.309	3.269	3.014	3.091	3.277	3.356	3.341	3.267	3.501	3.420
L.—3d, 12 35	3.480	3.370	3.410	3.560	3.480	3.553	3.640	3.697	3.737	3.353	3.663	3.710
U.—4th, 00 59	3.313	3.329	3.395	3.428	3.469	3.528	3.442	3.355	3.223	3.329	3.389	3.350
L.—4th, 13 25	3.357	3.270	3.340	3.350	3.423	3.410	3.403	3.383	3.437	3.453	3.443	3.480
U.—5th, 01 50	3.273	3.307	3.307	3.327	3.367	3.400	3.430	3.460	3.483	3.510	3.500	3.470
L.—5th, 14 18	3.216	3.244	3.254	3.268	3.280	3.304	3.314	3.3 4	3.362	3.364	3.354	3.380
U.—6th, 02 45	3.180	3.215	3.210	3.230	3.255	3.285	3.375	3.395	3.375	3.385	3.356	3.340
L.—6th, 15 15	3.160	3.155	3.177	3.160	3.220	3.250	3.265	3.295	3.355	3.420	3.420	3.450
U.—7th, 03 45	3.445	3.430	3.455	3.480	3.480	3.480	3.530	3.570	3.585	3.615	3.685	3.740
L.—7th, 16 15	3.490	3.500	3.488	3.475	3.515	3.550	3.575	3.580	3.575	3.605	3.665	3.730
U.—8th, 04 46	3.410	3.421	3.425	3.447	3.513	3.561	3.543	3.499	3.507	3.567	3.611	3.730
L.—8th, 17 17	3.487	3.481	3.465	3.517	3.598	3.627	3.589	3.537	3.560	3.601	3.633	3.620
U.—9th, 05 48	3.526	3.590	3.568	3.584	3.626	3.636	3.776	3.968	3.966	3.814	3.746	3.980

L.—9th,	18	18	3.680	3.666	3.740	3.730	3.646	3.672	3.752	3.856	3.994	3.948	4.038	3.980
U.—10th,	06	48	4.040	4.068	3.912	3.764	4.160	4.558	4.368	3.788	4.397	3.950	4.717	4.490
L.—10th,	19	15	4.030	4.230	3.920	4.150	4.300	4.200	4.230	4.180	4.290	4.520	4.120	4.210
U.—11th,	07	43	3.814	3.845	4.004	3.997	3.914	4.070	4.021	3.707	3.917	4.129	3.930	3.960
L.—11th,	20	09	3.785	3.941	4.097	3.941	3.884	3.697	3.683	3.897	3.913	3.736	3.899	3.970
U.—12th,	08	35	4.138	4.243	4.290	3.986	3.702	3.878	4.088	4.015	3.915	3.822	3.954	4.150
L.—12th,	21	00	3.960	3.810	4.020	4.130	4.170	4.060	3.930	3.700	3.850	3.910	3.980	4.090
U.—13th,	09	25	3.937	4.017	4.313	4.302	4.390	4.277	4.010	4.037	3.968	4.133	4.278	4.430
L.—13th,	21	48	3.148	3.052	3.058	3.084	3.168	3.176	3.196	3.040	3.124	3.070	3.020	2.730
U.—14th,	10	11	3.306	3.351	3.310	3.393	3.349	3.374	3.388	3.302	3.402	3.492	3.508	3.500
L.—14th,	22	35	3.300	3.212	3.257	3.200	3.282	3.500	3.797	4.017	3.972	3.787	3.527	3.180
U.—15th,	10	59	3.219	3.085	3.360	3.244	3.134	3.188	3.258	3.299	3.426	3.401	3.381	3.290
L.—15th,	23	23	3.291	3.356	3.408	3.359	3.378	3.421	3.468	3.503	3.556	3.624	3.671	3.570
U.—16th,	11	47	3.557	3.485	3.434	3.473	3.523	3.476	3.478	3.516	3.525	3.514	3.643	3.680
L.—17th,	00	11	3.622	3.744	3.859	3.910	3.952	4.017	3.978	4.007	4.072	4.070	4.093	4.100
U.—17th,	12	35	3.833	3.813	3.753	3.723	3.740	3.797	3.803	3.833	3.840	3.870	3.933	3.940
L.—18th,	01	00	3.690	3.6·0	3.650	3.740	3.770	3.790	3.770	3.750	3.770	3.790	3.820	3.740
U.—18th,	13	26	3.463	3.475	3.495	3.515	3.529	3.583	3.610	3.647	3.608	3.643	3.678	3.700
L.—19th,	01	53	3.777	3.808	3.881	3.923	3.915	3.941	3.950	3.927	3.882	3.778	3.785	3.780
U.—19th,	14	20	3.793	3.780	3.746	3.700	3.697	3.740	3.753	3.797	3.873	3.880	3.917	3.990
L.—20th,	02	46	3.625	3.364	4.451	4.233	3.613	4.676	4.278	3.508	4.496	4.231	3.912	3.990
U.—20th,	15	12	3.986	4.034	4.053	3.944	3.906	3.982	4.096	4.259	4.788	5.018	4.838	4.700
L.—21st,	03	40	3.613	3.613	3.690	3.917	3.997	3.777	3.910	4.133	3.947	3.980	4.037	4.090
U.—21st,	16	05	3.922	4.103	4.190	3.977	3.892	3.823	3.970	4.105	4.080	4.310	4.240	4.440
L.—22d,	04	31	4.193	4.272	4.319	4.280	4.269	4.238	4.191	4.230	4.234	4.362	4.415	4.570
U.—22d,	16	57	....	....	....	....	....	4.264	4.305	4.336	4.504	4.393	4.416	4.530
L.—23d,	05	21	3.992	3.852	3.975	4.046	4.007	3.959	3.978	3.934	3.854	3.858	3.905	3.890
U.—23d,	17	46	3.679	3.659	3.631	3.656	3.659	3.634	3.604	3.611	3.646	3.665	3.686	3.690
L.—24th,	06	10	3.817	3.837	3.773	3.757	3.793	3.820	3.843	3.857	3.907	3.957	3.943	3.870
U.—24th,	18	33	3.634	3.712	3.698	3.756	3.772	3.818	3.876	3.914	3.864	3.938	4.034	3.920
L.—25th,	06	55	4.033	3.987	2.990	4.180	4.190	4.213	4.267	4.327	4.300	4.317	4.317	4.390
U.—25th,	19	16	4.466	4.333	4.347	4.221	4.240	4.273	4.304	4.313	4.427	4.338	4.281	4.320
L.—26th,	07	37	4.283	4.281	4.483	4.693	4.842	4.662	4.555	4.543	4.641	4.606	4.531	4.540
U.—26th,	19	58	4.438	4.374	4.342	4.377	4.389	4.315	4.357	4.313	4.338	4.293	4.215	4.370
L.—27th,	08	19	4.129	4.100	4.119	4.162	4.155	4.159	4.202	4.157	4.164	4.215	4.217	4.240
U.—27th,	20	40	4.010	3.977	3.943	3.913	3.883	3.900	3.923	3.940	3.977	4.017	4.020	4.040
L.—28th,	09	00	3.920	3.940	3.920	3.950	3.950	3.980	3.940	3.920	3.960	3.990	4.010	4.050
U.—28th,	21	21	3.898	3.887	3.932	3.936	3.972	4.018	4.051	4.116	4.154	4.174	4.208	4.250
L.—29th,	09	43	4.173	4.194	4.209	4.207	4.199	4.227	4.259	4.281	4.237	4.207	4.212	4.230
U.—29th,	22	05	4.053	4.053	4.073	4.088	4.073	4.073	4.045	4.070	4.073	4.095	4.127	4.180
L.—30th,	10	27	3.912	3.909	3.946	3.941	3.985	4.017	4.011	4.046	4.086	4.117	4.102	4.100
U.—30th,	22	50	3.930	3.960	3.977	3.973	3.983	3.970	3.967	3.983	3.997	4.027	4.080	4.120
May, 1859.														
L.—1st,	11	15	4.065	4.050	4.040	4.050	4.060	4.045	4.035	4.070	4.085	4.105	4.135	4.120
U.—1st,	23	40	3.990	4.017	4.040	4.040	4.047	4.120	4.117	4.147	4.240	4.190	4.157	4.160
L.—2d,	12	08	4.169	4.130	4.111	4.171	4.196	4.269	4.281	4.276	4.321	4.275	4.305	4.340
U.—3d,	00	36	4.118	4.148	4.126	4.102	4.098	4.152	4.186	4.192	4.218	4.248	4.190	4.150
L.—3d,	13	05	4.123	4.113	4.093	4.117	4.163	4.237	4.230	4.317	4.247	4.250	4.263	4.310
U.—4th,	01	35	3.993	4.020	3.967	3.983	3.963	4.003	4.030	4.057	4.033	4.117	4.110	4.120
L.—4th,	14	06	3.966	3.941	3.930	3.906	3.896	3.920	3.916	3.906	3.934	3.956	3.978	3.970
U.—5th,	02	38	3.761	3.715	3.749	3.887	3.911	3.943	3.955	3.965	4.961	4.011	4.070	3.980

TABLE H 5—Continued.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIME AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.															Moon's age at time of meridian transit.	Moon's apparent declination at time of her meridian transit. U., upper; L., lower. + north; — south.	Sun's apparent declination at time of moon's meridian transit. + N.— S.
	0*h*. 30*m*.	0*h*. 45*m*.	1*h*. 00*m*	1*h*. 15*m*.	1*h*. 30*m*	2*h* 00*m*	2*h*. 30*m*	3*h*. 00*m*.	3*h*. 30*m*	4*h*. 00*m*	4*h*. 30*m*	5*h*. 00*m*	5*h*. 30*m*.	6*h*. 00*m*	6*h*. 30*m*.			
	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	*d.* *h.* *m.*	° ′	° ′
March, 1859.																		
L.—24th, 04*h*. 57*m*.	2.589	2.662	3.727	2.756	2.776	2.699	2.789	2.764	2.778	2.708	2.808	2.847	2.886	2.881	2.934	20 03 40	L. — 27 48	+ 1 30
U.—24th, 17 24	3.698	3.728	3.758	3.725	3.650	3.556	3.524	3.496	3.466	3.396	3.248	3.238	3.312	3.362	3.346	20 16 05	U. 28 02	1 43
L.—25th, 05 50	3.397	3.377	3.357	3.370	3.360	3.293	3.300	3.270	3.253	3.200	3.290	3.287	3.310	3.350	3.343	21 04 30	L. 27 53	1 55
U.—25th, 18 15	3.320	3.290	3.250	3.230	3.240	3.210	3.210	3.270	3.270	3.200	3.160	3.270	3.300	3.450	3.390	21 16 55	U. 27 25	2 07
L.—26th, 06 40	3.500	3.363	3.293	3.353	3.450	3.530	3.613	3.493	3.380	3.450	3.363	3.310	3.307	3.350	3.467	22 05 20	L. 26 36	2 19
U.—26th, 19 05	3.580	3.577	3.650	3.753	3.837	3.960	3.977	3.740	3.727	3.733	3.703	3.500	3.740	3.983	3.727	22 17 45	U. 25 27	2 31
L.—27th, 07 30	3.730	7.750	3.690	3.620	3.490	3.650	3.840	3.790	3.980	3.930	3.820	....	....	4.090	....	23 06 10	L. 24 02	2 43
U.—27th, 19 54	3.692	3.728	3.758	3.743	3.698	3.648	3.688	3.636	3.588	3.716	3.846	3.968	4.240	4.150	4.144	23 18 35	U. 22 19	2 55
L.—28th, 08 16	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	24 06 55	L. 20 22	3 07
U.—28th, 20 39	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	24 19 20	U. 18 12	3 20
L.—29th, 09 01	....	....	....	....	....	....	3.335	3.309	3.291	3.329	3.299	3.259	3.242	3.290	3.299	25 07 40	L. 15 50	3 32
U.—29th, 21 23	3.040	3.099	3.154	3.204	3.249	3.293	3.200	3.185	3.083	3.127	3.181	3.098	3.155	3.129	3.056	25 20 05	U. 13 17	3 44
L.—30th, 09 45	3.220	3.210	3.195	3.180	3.160	3.165	3.210	3.260	3.330	3.395	3.450	3.495	3.490	3.450	3.440	26 08 25	L. 10 36	3 56
U.—30th, 22 05	3.340	3.310	3.282	3.257	3.240	3.247	3.278	3.268	3.273	3.342	3.340	3.282	3.234	3.175	3.140	26 20 45	U. 7 46	4 07
L.—31st, 10 25	8.348	3.373	3.393	3.393	3.383	....	....	....	....	....	....	....	....	....	....	27 09 05	L. — 4 50	+ 4 19
....	....	....	....	....	....	3.405	3.443	3.467	3.437	3.380	3.278	3.227	3.245	3.242	3.200	....	....	....
U.—31st, 22 45	3.860	3.900	3.945	3.990	4.005	3.995	3.905	3.765	3.775	3.815	3.745	3.660	3.585	3.700	3.860	27 21 25	U. — 1 52	+ 4 31
April, 1859.																		
L.—1st, 11*h* 06*m*.	4.240	4.265	4.272	4.252	4.250	4.296	4.308	4.272	4.040	3.942	4.004	3.884	3.828	3.896	3.862	28 09 45	L. + 1 16	4 43
U.—1st, 23 28	4.274	4.229	4.159	4.167	4.187	3.987	4.315	3.804	3.539	3.601	3.636	3.864	3.760	4.069	3.717	28 22 10	U. 4 19	4 55
L.—2d, 11 50	3.400	3.510	3.453	3.350	3.297	3.117	2.863	3.057	2.993	3.197	3.186	3.510	3.545	3.290	3.400	29 10 30	L. 7 22	5 07
U.—3d, 00 11	3.406	3.511	3.577	3.612	3.517	3.591	3.617	3.625	3.747	3.751	3.555	3.311	3.452	3.336	3.336	0 07 43	U. 10 23	5 19
L.—3d, 12 35	3.707	3.667	3.700	3.720	3.667	3.563	3.510	3.617	3.397	3.503	3.537	3.540	3.423	3.440	3.397	0 20 08	L. 13 18	5 30
U.—4th, 00 59	3.337	3.349	3.322	3.283	3.243	3.182	3.215	3.375	3.322	3.336	3.315	3.288	3.275	3.297	3.386	1 08 33	U. 16 08	5 43
L.—4th, 13 25	3.525	3.517	3.497	3.427	3.332	3.275	3.220	3.347	3.317	3.335	3.298	3.230	3.353	3.302	3.265	1 20 58	L. 18 45	5 56
U.—5th, 01 50	8.420	3.390	3.360	3.347	3.367	3.367	3.380	3.363	3.337	3.303	3.277	3.290	3.273	3.247	3.220	2 09 23	U. 21 09	6 06
L.—5th, 14 18	3.408	3.403	3.418	3.426	3.406	3.378	3.370	3.346	3.312	3.312	3.290	3.252	3.168	3.108	3.136	2 21 53	L. 23 16	6 18
U.—6th, 02 45	3.325	3.310	3.315	3.320	3.310	3.315	3.320	3.290	3.235	3.215	3.220	3.240	3.240	3.225	3.200	3 10 18	U. 25 02	6 30
L.—6th, 15 15	3.560	3.590	3.575	3.560	3.545	3.535	3.515	3.465	3.420	3.385	3.350	3.395	3.410	3.420	3.450	3 22 48	L. 26 25	6 41
U.—7th, 03 45	3.750	3.720	3.650	3.580	3.630	3.655	3.610	3.600	3.620	3.610	3.575	3.550	3.530	3.540	3.505	4 11 18	U. 27 23	6 53
L.—7th, 16 15	3.810	3.800	3.780	3.760	3.800	3.800	3.740	3.710	3.685	3.655	3.600	3.550	3.510	3.465	3.425	4 23 48	L. 27 52	7 05
U.—8th, 04 46	3.637	3.597	3.557	3.522	3.547	3.549	3.503	3.485	3.469	3.434	3.431	3.467	3.538	3.553	3.519	5 12 18	U. 27 51	7 16
L.—8th, 17 17	3.613	3.628	3.613	3.599	3.594	3.573	3.554	3.533	3.543	3.543	3.530	3.479	3.412	3.420	3.460	6 00 53	L. 27 23	7 28
U.—9th, 05 48	4.032	3.912	3.868	3.830	3.882	4.018	4.188	3.946	3.790	3.778	3.790	3.804	3.802	3.730	3.678	6 13 23	U. 26 21	7 41

L.—9th,	18	18 .	4.012	4.066	4.086	4.060	3.998	3.904	4.610	4.316	4.026	3.878	4.652	4.894	4.319	3.930	4.759	7	01	53	L.	24	59	7	52
U.—10th,	06	48 .	3.974	4.191	4.552	4.758	4.991	4.178	4.150	3.940	4.555	4.651	4.486	4.052	4.678	4.015	3.678	7	14	23	U.	23	05	8	03
L.—10th,	19	15 .	4.290	3.860	4.000	4.530	4.400	4.200	4.180	4.550	4.520	4.460	4.220	4.230	4.150	4.170	4.470	8	02	48	L.	20	54	8	14
U.—11th,	07	43 .	3.957	4.060	4.158	3.964	3.856	3.734	4.093	3.981	3.717	3.872	4.210	4.041	4.365	4.150	3.775	8	15	18	U.	18	21	8	26
L.—11th,	20	09 .	4.001	3.986	3.947	3.892	3.801	3.628	3.648	3.772	3.925	3.890	4.238	3.940	3.552	3.859	4.029	9	03	43	L.	15	32	8	37
U.—12th,	08	35 .	4.115	4.220	4.233	4.063	4.046	4.343	4.075	3.890	3.805	3.650	3.785	4.138	4.007	3.865	3.762	9	16	08	U.	12	30	8	49
L.—12th,	21	00 .	4.130	4.115	4.100	4.115	4.130	4.080	4.270	3.950	3.990	4.280	4.050	3.740	3.820	3.890	3.870	10	04	33	L.	9	13	9	00
U.—13th,	09	25 .	4.364	4.274	4.220	3.739	3.779	3.917	4.090	4.187	4.025	3.917	3.835	3.922	3.931	3.745	3.375	10	16	58	U.	5	59	9	11
L.—13th,	21	48 .	2.796	2.768	2.808	2.847	2.882	2.988	3.076	3.130	3.204	3.282	3.280	3.236	3.250	3.306	3.300	11	05	23	L.	+ 2	36	9	22
U.—14th,	10	11 .	3.848	4.023	....	....	....	....	....	....	3.747	3.657	3.626	3.637	3.525	3.379	3.395	11	17	43	U.	— 0	46	9	34
L.—14th,	22	35 .	3.123	3.133	3.148	3.173	3.178	3.107	3.075	3.247	3.198	3.045	3.077	3.105	3.088	3.142	3.200	12	06	08	L.	4	08	9	45
U.—15th,	10	59 .	3.338	3.298	3.253	3.325	3.405	3.671	3.535	3.501	3.558	3.425	3.381	3.467	3.364	3.202	3.229	12	18	33	U.	7	26	9	56
L.—15th,	23	23 .	3.613	3.661	3.627	3.579	3.575	3.620	3.619	3.564	3.491	3.460	3.429	3.447	3.516	3.606	3.621	13	06	53	L.	10	35	10	07
U.—16th,	11	47 .	3.730	3.726	3.696	3.673	3.682	3.588	3.535	3.545	3.525	3.493	3.416	3.424	3.487	3.537	3.565	13	19	18	U.	13	53	10	18
L.—17th,	00	11 .	4.135	4.147	4.121	4.103	4.100	4.091	4.107	4.051	4.033	3.985	3.973	3.895	3.692	3.981	3.898	14	07	43	L.	16	24	10	29
U.—17th,	12	35 .	3.877	3.853	3.850	3.839	3.820	3.753	3.777	3.693	3.707	3.660	3.633	3.617	3.580	3.633	3.660	14	20	08	U.	18	58	10	40
L.—18th,	01	00 .	3.670	3.650	3.640	4.620	3.600	3.680	3.670	3.630	3.580	3.560	3.540	3.550	3.520	3.530	3.510	15	08	33	L.	21	16	10	50
U.—18th,	13	26 .	3.772	3.773	3.763	3.797	3.847	3.929	4.027	3.988	3.911	3.839	3.795	3.755	3.724	3.865	3.784	15	20	58	U.	23	14	11	01
L.—19th,	01	53 .	3.853	3.863	3.868	3.875	3.885	3.875	3.893	3.915	3.905	3.923	3.899	3.859	3.819	3.795	3.782	16	09	28	L.	24	54	11	12
U.—19th,	14	20 .	4.077	4.088	4.143	4.170	4.140	4.060	4.010	4.067	4.320	4.590	4.483	4.930	4.222	3.880	3.847	16	21	53	U.	26	12	11	23
L.—20th,	02	46 .	4.123	3.955	4.041	4.119	4.099	4.069	3.959	3.833	3.795	3.817	4.022	3.749	3.810	3.981	4.038	17	10	18	L.	27	07	11	34
U.—20th,	15	12 .	4.516	4.491	4.392	4.282	4.056	4.136	4.046	3.998	3.960	3.902	3.832	3.734	3.642	3.626	3.620	17	22	48	U.	27	40	11	44
L.—21st,	03	40 .	3.847	3.797	3.767	3.747	3.770	4.007	4.140	3.673	3.613	3.677	3.860	3.900	3.820	3.710	3.730	18	11	13	L.	27	50	11	55
U.—21st,	16	05 .	4.295	4.310	4.360	4.480	4.588	4.745	4.798	4.638	4.355	4.224	4.143	4.097	4.010	4.085	4.082	18	23	38	U.	27	38	12	07
L.—22d,	04	31 .	4.357	4.347	4.306	4.251	4.203	4.281	4.319	4.292	4.359	4.328	4.264	4.371	4.392	4.450	....	19	12	03	L.	27	03	12	18
U.—22d,	16	57 .	4.494	4.442	4.382	4.378	4.388	4.318	4.112	3.982	3.952	4.094	4.054	4.084	3.982	3.997	4.018	20	00	28	U.	26	13	12	26
L.—23d,	05	21 .	3.935	3.916	3.881	3.846	3.811	3.797	3.772	3.739	3.695	3.687	3.739	3.746	3.698	3.666	3.681	20	12	53	L.	25	01	12	36
U.—23d,	17	46 .	3.702	3.729	3.914	3.698	3.673	3.613	3.559	3.524	3.505	3.521	3.578	3.729	3.791	3.811	3.809	21	01	18	U.	23	32	12	46
L.—24th,	06	10 .	3.900	3.903	3.873	3.840	3.843	3.827	3.767	3.833	3.897	3.887	3.843	3.800	3.753	3.777	3.670	21	13	43	L.	21	47	12	57
U.—24th,	18	33 .	3.844	3.868	3.914	3.934	3.884	3.874	3.904	3.968	4.052	3.944	3.928	3.955	3.930	4.054	4.056	22	02	08	U.	19	44	13	06
L.—25th,	06	55 .	4.300	4.277	4.310	4.363	4.357	4.430	4.470	4.510	4.537	4.567	4.657	4.570	4.580	4.473	4.473	22	14	28	L.	17	31	13	17
U.—25th,	19	16	4.249	4.229	4.209	4.200	4.199	4.151	4.202	4.209	4.169	4.148	4.139	4.095	4.055	4.193	4.194	23	02	48	U.	15	26	13	27
L.—26th,	07	37 .	4.542	4.519	4.516	4.523	4.578	4.611	4.519	4.513	4.479	4.487	4.505	4.497	4.508	4.456	4.417	23	15	11	L.	12	41	13	37
U.—26th,	19	58 .	4.417	4.437	4.457	4.451	4.471	4.375	4.258	4.278	4.261	4.335	4.443	4.487	4.331	4.252	4.185	24	03	33	U.	9	56	13	47
L.—27th,	08	19 .	4.284	4.276	4.261	4.249	4.244	4.221	4.225	4.208	4.177	4.138	4.063	4.062	4.061	4.012	4.028	24	15	53	L.	7	12	13	57
U.—27th,	20	40 .	4.083	4.073	4.067	4.062	4.060	4.067	4.073	4.033	3.997	4.003	3.957	3.967	3.967	3.967	3.940	25	04	13	U.	4	17	14	07
L.—28th,	09	00 .	4.040	4.095	4.150	4.190	4.230	4.220	4.170	4.190	4.120	4.100	4.120	4.090	3.980	8.990	3.940	25	16	33	L.	— 1	19	14	20
U.—28th,	21	21 .	4.251	4.264	4.274	4.280	4.280	4.290	4.236	4.202	4.211	4.255	4.235	4.185	4.142	4.102	4.155	26	04	53	U.	+ 1	43	14	26
L.—29th,	09	43 .	4.243	4.258	4.217	4.232	4.234	4.223	4.196	4.177	4.164	4.161	4.163	4.180	4.158	4.137	4.080	26	17	16	L.	4	48	14	35
U.—29th,	22	05 .	4.207	4.197	4.190	4.196	4.192	4.195	4.158	4.088	4.022	4.977	3.967	3.990	3.938	3.935	3.955	27	05	38	U.	7	50	14	45
L.—30th,	10	27 .	4.129	4.118	4.103	4.092	4.082	....	....	....	....	....	....	....	....	....	....	27	17	59	L.	+ 10	50	+14	54
.....	....	.....	....	....	....	....	....	4.071	4.008	4.054	4.059	4.021	3.963	3.978	3.946	3.949	3.914	.....	.....	.....	.....	.....	.....	.....	.....
U.—30th,	22	50 .	4.107	4.102	4.107	4.117	4.137	4.157	4.180	4.177	4.153	4.117	4.090	4.073	4.077	4.093	4.073	28	06	23	U.	+ 13	45	+15	04
May, 1859.																									
L.—1st,	11*h*	15*m*	4.105	4.110	4.090	4.110	4.090	4.050	4.060	4.060	4.010	3.970	3.940	3.870	3.930	3.960	3.970	28	18	48	L.	16	33	15	14
U.—1st,	23	40 .	4.177	4.180	4.200	4.223	4.223	4.240	4.347	4.257	4.200	4.187	4.155	4.160	4.150	4.163	4.163	29	07	13	U.	19	15	15	22
L.—2d,	12	08 .	4.331	4.324	4.294	4.298	4.299	4.285	4.225	4.219	4.221	4.209	4.160	4.185	4.201	4.154	4.141	00	08	16	L.	21	33	15	32
U.—3d,	00	36 .	4.206	4.180	4.146	4.132	4.112	4.116	4.106	4.091	4.108	4.082	4.124	4.126	4.186	4.158	4.126	00	20	41	U.	23	35	15	41
L.—3d,	13	05 .	4.263	4.283	4.310	4.317	4.317	4.260	4.250	4.263	4.193	4.180	4.170	4.127	4.160	4.037	4.077	1	09	11	L.	25	18	15	50
U.—4th,	01	35 .	4.120	4.127	4.130	4.117	4.120	4.083	4.060	3.993	4.003	3.962	3.925	3.957	3.993	4.008	3.995	1	21	41	U.	26	35	15	59
L.—4th,	14	06 .	4.004	4.014	4.022	4.027	4.024	3.994	4.986	3.958	3.994	4.004	3.986	4.002	3.952	3.870	3.820	2	10	11	L.	27	24	16	08
U.—5th,	02	38	4.011	4.031	4.045	4.055	4.052	4.022	3.987	3.931	3.837	3.822	3.805	3.815	3.789	3.765	3.777	2	22	46	U.	+ 27	45	+16	17

TABLE H 5—Continued.

Date and time of moon's meridian transit. U., upper; L, lower. Astronomical account.	TIME PRECEDING THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.											Moon in meridian.
	5*h.* 30*m.*	5*h.* 00*m.*	4*h.* 30*m.*	4*h.* 00*m.*	3*h.* 30*m.*	3*h.* 00*m.*	2*h.* 30*m.*	2*h.* 00*m.*	1*h.* 30*m.*	1*h.* 00*m.*	0*h.* 30*m.*	0
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals	Feet and decimals.	Feet and decimals	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
May, 1859.												
L.—5th, 15*h.* 09*m*	3.761	3.750	3.783	3.797	3.799	3.832	3.869	3.893	3.897	3.899	3.920	3.930
U.—6th, 03 40	3.883	3.900	3.907	3.863	3.867	3.970	4.027	4.010	4.007	4.050	4.070	4.100
L.—6th, 16 10	3.917	3.887	3.900	3.897	3.923	3.953	3.950	3.917	3.893	3.890	3.887	3.950
U.—7th, 04 41	3.940	3.962	3.971	3.931	3.965	3.946	3.881	3.911	3.930	3.937	3.943	3.970
L.—7th, 17 10	3.860	3.832	3.840	3.853	3.860	3.907	3.920	3.910	3.887	3.897	3.943	3.960
U.—8th, 05 39	3.976	4.020	4.108	4.171	4.214	4.209	4.236	4.250	4.229	4.210	4.343	4.340
L.—8th, 18 05	4.297	4.343	4.343	4.383	4.463	4.477	4.483	4.457	4.513	4.543	4.590	4.640
U.—9th, 06 31	4.501	3.469	4.427	4.422	4.451	4.443	4.533	4.488	4.452	4.519	4.458	4.480
L.—9th, 18 56	4.221	4.136	4.185	4.160	4.203	4.265	4.272	4.278	4.325	4.271	4.248	4.260
U.—10th, 07 21	4.178	4.086	3.924	3.974	4.032	4.004	4.108	4.062	4.102	4.182	4.198	4.230
L.—10th, 19 45	3.890	3.840	3.870	3.950	3.990	3.980	3.890	3.800	3.870	4.960	4.050	4.000
U —11th, 08 09	3.916	3.929	3.978	4.029	4.035	3.979	3.942	3.976	3.969	3.911	3.887	3.900
L.—11th, 20 32	3.912	3.940	3.937	3.893	3.929	3.922	3.952	3.984	4.041	4.065	4.138	4.250
U.—12th, 08 55	3.937	3.863	3.817	3.885	3.958	4.012	3.987	4.255	4.235	4.137	4.137	4.040
L.—12th, 21 18	3.992	3.996	4.070	4.202	4.490	4.494	4.408	4.372	4.310	4.338	4.406	4.460
U.—13th 09 40	3.983	3.870	3.843	3.887	3.957	4.027	4.033	4.080	4.123	4.117	4.103	4.050
L.—13th, 22 05	4.223	4.193	4.222	4.288	4.323	4.280	4.233	4.238	4.170	4.128	4.178	4.200
U.—14th, 10 29	4.199	4.227	4.104	4.032	4.069	4.022	3.952	3.989	4.193	4.161	4.131	4.090
L.—14th, 22 54	4.360	4.378	4.386	4.286	4.320	4.266	4.202	4.214	4.244	4.210	4.168	4.230
U.—15th, 11 18	3.984	4.042	4.032	4.014	3.914	3.916	3.910	3.996	4.012	4.126	4.196	4.280
L.—15th, 23 45	3.960	4.060	3.950	3.900	4.100	4.140	4.070	4.150	4.220	4.110	4.030	4.190
U —16th, 12 10	4.067	4.083	4.125	4.013	3.997	4.040	4.120	4.093	4.147	4.124	4.207	4.170
L.—17th, 00 36	4.012	3.988	4.038	4.070	4.098	4.102	4.118	4.092	4.128	4.136	4.136	3.950
U.—17th, 13 03	3.776	3.850	3.866	3.914	3.986	4.012	4.010	4.068	4.146	4.034	3.932	3.960
L.—18th, 01 30	4.140	4.130	4.150	4.220	4.250	4.270	4.330	4.370	4.390	4.430	4.590	4.640
U.—18th, 13 57	4.402	4.499	4.474	4.438	4.485	4.481	4.525	4.593	4.654	4.624	4.647	4.690
L.—19th, 02 23	4.468	4.472	4.416	4.446	4.483	4.436	4.366	4.381	4.451	4.508	4.505	4.450
U.—19th, 14 48	4.242	4.260	4.256	4.228	4.262	4.308	4.344	4.348	4.358	4.322	4.302	4.330
L.—20th, 03 14	4.331	4.324	4.349	4.365	4.347	4.306	4.262	4.211	4.232	4.313	4.383	4.430
U.—20th, 15 39	4.276	4.226	4.231	4.325	4.281	4.269	4.317	4.371	4.359	4.395	4.439	4.500
L —21st, 04 03	4.242	4.261	4.275	4.315	4.265	4.217	4.192	4.206	4.164	4.112	4.133	4.170
U.—21st, 16 27	3.903	3.894	3.904	3.915	3.968	4.024	4.003	4.108	4.102	4.118	4.156	4.210
L.—22d, 04 48	3.958	3.958	4.022	4.100	4.108	4.124	4.152	4.184	4.170	4.132	4.102	4.110
U —22d, 17 10	3.917	3.940	3.897	3.907	3.947	3.970	3.997	4.000	4.007	4.073	4.090	4.090
L.—23d, 05 31	4.098	4.037	3.942	3.905	3.999	3.952	4.022	4.001	4.033	4.069	4.069	4.040

U.—23d,	17	53	3.955	3.918	3.891	3.930	3.971	3.997	4.064	4.010	4.004	4.016	3.995	4.080
L.—24th,	06	14	3.921	3.869	3.653	3.720	3.737	3.816	3.845	3.935	4.139	4.258	4.291	4.140
U.—24th,	18	35	4.187	4.217	4.273	4.267	4.220	4.307	4.383	4.377	4.447	4.467	4.343	4.310
L.—25th,	06	55	4.137	4.217	4.287	4.213	4.377	4.390	4.490	4.487	4.480	4.517	4.423	4.290
U.—25th,	19	15	4.265	4.280	4.345	4.420	4.445	4.440	4.495	4.560	4.525	4.420	4.390	4.360
L.—26th,	07	36	4.218	4.170	4.176	4.218	4.300	4.352	4.414	4.460	4.426	4.440	4.440	4.630
U.—26th,	19	57	3.442	3.321	3.365	3.469	3.516	3.457	3.405	3.643	3.823	4.002	3.885	3.940
L.—27th,	08	18	4.090	4.088	4.100	4.088	4.110	4.118	4.134	4.174	4.250	4.278	4.312	4.380
U.—27th,	20	40	4.057	3.943	3.977	3.973	3.917	3.897	3.980	4.033	4.037	4.083	4.103	4.060
L.—28th,	09	04	3.890	3.949	4.018	4.073	4.094	4.129	4.183	4.139	4.143	4.239	4.293	4.270
U.—28th,	21	28	4.771	4.517	4.455	4.413	4.447	4.506	4.491	4.546	4.625	4.667	4.698	4.930
L.—29th,	09	55	4.422	4.405	4.437	4.482	4.398	4.355	4.367	4.395	4.450	4.452	4.443	4.460
U.—29th,	22	21	4.475	4.518	4.614	4.622	4.505	4.411	4.425	4.489	4.559	4.615	4.588	4.590
L.—30th,	10	59	4.540	4.457	4.380	4.420	4.410	4.397	4.380	4.450	4.550	4.553	4.507	4.530
U.—30th,	23	20	4.723	4.643	4.627	4.550	4.473	4.440	4.410	4.380	4.357	4.397	4.453	4.500
L.—31st,	11	51	4.290	4.336	4.310	4.278	4.376	4.420	4.386	4.418	4.352	4.384	4.368	4.330
June, 1859.														
U.—1st,	00	23	4.319	4.276	4.301	4.286	4.271	4.259	4.225	4.302	4.391	4.481	4.306	4.340
L.—1st,	12	55	4.260	4.287	4.193	4.383	4.267	4.343	4.410	4.407	4.713	4.890	4.960	4.930
U.—2d,	01	27	3.982	4.116	4.094	4.092	4.100	4.284	4.186	3.976	3.924	3.830	4.172	4.290
L.—2d,	14	00	4.230	4.100	3.800	4.370	4.510	4.330	4.400	4.520	4.460	4.350	4.420	4.450
U.—3d,	02	32	4.674	4.729	4.727	4.826	4.772	4.795	4.721	4.588	4.572	4.749	4.904	4.670
L.—3d,	15	02	5.104	5.135	4.836	4.925	4.993	5.041	5.185	5.112	4.995	4.925	4.838	4.670
U.—4th,	03	32	4.770	4.668	4.562	4.570	4.666	4.766	4.656	4.568	4.675	4.468	4.586	4.670
L.—4th,	16	00	4.170	4.260	4.240	4.190	4.130	4.110	4.180	4.230	4.220	4.270	4.350	4.370
U.—5th,	04	28	4.211	4.182	4.217	4.192	4.246	4.315	4.376	4.249	4.324	4.153	4.243	4.470
L.—5th,	16	53	4.151	4.182	4.236	4.235	4.207	4.231	4.294	4.310	4.287	4.334	4.381	4.360
U.—6th,	05	18	4.188	4.272	4.386	4.406	4.318	4.240	4.358	4.462	4.404	4.312	4.310	4.360
L.—6th,	17	42	4.184	4.214	4.242	4.280	4.380	4.326	4.404	4.378	4.440	4.396	4.336	4.300
U.—7th,	06	06	4.032	4.018	3.970	3.998	4.040	4.082	4.042	4.114	4.212	4.424	4.673	4.210
L.—7th,	18	30	4.290	4.310	4.230	4.270	4.200	4.100	4.280	4.460	4.410	4.390	4.290	4.340
U.—8th,	06	53	4.353	4.311	4.231	4.209	4.193	4.150	4.201	4.169	4.193	4.289	4.311	4.330
L.—8th,	19	16	4.251	4.313	4.339	4.357	4.375	4.349	4.335	4.313	4.279	4.281	4.290	4.240
U.—9th,	07	39	4.306	4.323	4.327	4.335	4.331	4.231	4.177	4.115	4.108	3.986	3.990	3.850
L.—9th,	20	02	4.457	4.415	4.499	4.611	4.493	4.539	4.674	4.727	4.681	4.687	4.617	4.750
U.—10th,	08	25	4.627	4.608	4.625	4.747	4.695	4.563	4.565	4.587	4.615	4.528	4.552	4.600
L.—10th,	20	50	4.443	4.497	4.493	4.513	4.570	4.563	4.510	4.413	4.433	4.393	4.323	4.280
U.—11th,	09	14	4.317	4.280	4.267	4.216	4.256	4.259	4.223	4.274	4.304	4.311	4.323	4.360
L.—11th,	21	39	3.967	4.012	3.934	3.862	3.923	4.036	4.111	4.132	4.223	4.151	4.136	4.110
U.—12th,	10	04	4.165	4.125	4.042	4.111	4.041	3.969	3.904	3.958	4.137	4.125	4.164	4.190
L.—12th,	22	30	3.750	3.940	4.050	4.120	4.120	4.160	4.200	4.220	4.270	4.250	4.300	4.350
U.—13th,	10	55	4.282	4.287	4.265	4.268	4.312	4.215	4.197	4.332	4.313	4.382	4.298	4.350
L.—13th,	23	22	4.452	4.375	4.277	4.281	4.319	4.557	4.702	4.553	4.473	4.689	4.607	4.490
U.—14th,	11	50	4.660	4.780	4.623	4.753	4.640	4.497	4.543	4.460	4.450	4.550	4.523	4.690
L.—15th,	00	15	4.450	4.310	4.290	4.190	3.930	4.210	4.220	4.370	4.210	4.650	4.490	4.730
U.—15th,	12	41	4.307	4.305	4.264	4.369	4.233	4.137	4.343	4.276	4.337	4.375	4.407	4.480
L.—16th,	01	07	4.313	4.428	4.275	4.221	4.361	4.273	4.375	4.339	4.481	4.511	4.496	4.500
U.—16th,	13	33	4.457	4.429	4.421	4.361	4.397	4.453	4.394	4.430	4.436	4.496	4.546	4.490
L.—17th,	01	57	4.629	4.577	4.444	4.394	4.417	4.357	4.413	4.555	4.548	4.527	4.493	4.530
U.—17th,	14	21	4.401	4.422	4.446	4.359	4.357	4.409	4.409	4.491	4.558	4.528	4.496	4.540
L.—18th,	02	44	4.349	4.365	4.360	4.365	4.379	4.404	4.406	....	....	....	4.403	4.480

TABLE II 5—Continued.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIME AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.															Moon's age at time of meridian transit.			Moon's apparent declination at time of her meridian transit. U., upper; L., lower. + north; — south.			Sun's apparent declination at time of moon's meridian transit. + N., — S.	
	0h. 30m.	0h. 45m.	1h. 00m.	1h. 15m.	1h. 30m.	2h. 00m.	2h. 30m.	3h. 00m.	3h. 30m.	4h. 00m.	4h. 30m.	5h. 00m.	5h. 30m.	6h. 00m.	6h. 30m.								
	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	d.	h.	m.		°	'	°	'
May, 1859.																							
L.—5th, 15h. 03m.	3.906	3.916	3.917	3.912	3.904	3.878	3.856	3.879	3.900	3.891	3.867	3.862	3.893	3.891	3.873	3	11	16	L.	+ 27	34	+16	26
U.—6th, 03 40	4.067	4.017	4.013	3.973	3.970	3.973	3.947	3.940	3.907	3.910	3.877	3.843	3.653	3.927	3.963	3	23	46	U.	26	51	16	53
L.—6th, 16 10	3.953	3.973	3.997	4.022	4.020	3.987	3.950	3.900	3.857	3.863	3.850	3.873	3.907	3.913	3.913	4	12	16	L.	25	42	16	43
U.—7th, 04 41	3.994	3.959	3.913	3.933	3.934	3.955	3.973	3.949	3.923	3.910	3.895	3.881	3.907	3.913	3.889	5	00	46	U.	24	01	16	52
L.—7th, 17 19	4.003	4.023	4.027	4.022	4.040	4.063	4.010	3.973	3.987	4.010	4.003	3.914	3.910	3.963	3.983	5	13	16	L.	22	02	17	01
U.—8th, 06 39	4.202	4.222	4.248	4.278	4.299	4.325	4.322	4.286	4.318	4.372	4.391	4.355	4.314	4.309	4.306	6	01	46	U.	19	43	17	09
L.—8th, 18 05	4.583	4.503	4.430	4.400	4.427	4.477	4.467	4.440	4.440	4.500	4.580	4.476	4.380	4.517	4.513	6	14	11	L.	16	59	17	17
U.—9th, 06 31	4.518	4.519	4.497	4.462	4.489	4.403	4.505	4.339	4.333	4.334	4.349	4.282	4.277	4.289	4.231	7	02	36	U.	14	09	17	25
L.—9th, 18 56	4.294	4.305	4.295	4.261	4.235	4.228	4.292	4.211	4.079	4.227	4.394	4.498	4.406	4.149	4.100	7	15	01	L.	10	58	17	33
U.—10th, 07 21	4.216	4.236	4.210	4.161	4.152	4.092	4.183	4.210	4.264	4.228	4.164	4.078	4.016	4.012	3.946	8	03	26	U.	7	54	17	42
L.—10th, 19 45	4.100	4.080	4.110	4.140	4.120	4.070	3.940	3.920	3.920	3.970	4.0 5	3.960	3.885	3.910	3.930	8	15	51	L.	4	26	17	51
U.—11th, 08 09	3.971	4.006	4.014	4.094	4.009	4.003	3.922	3.883	4.902	4.909	3.851	3.843	3.846	3.873	3.875	9	04	16	U.	+ 1	20	17	59
L.—11th, 20 32	4.318	4.303	4.289	4.279	4.272	4.297	4.251	4.267	4.221	4.091	3.970	3.979	4.099	4.072	3.967	9	16	36	L.	— 1	57	18	06
U.—12th, 08 55	4.027	4.003	3.963	3.947	3.912	3.898	3.907	3.893	3.932	3.923	3.887	3.905	4.002	3.968	3.952	10	05	01	U.	5	13	18	14
L.—12th, 21 18	4.490	4.478	4.418	4.372	4.382	4.366	4.428	4.426	4.360	4.370	4.366	4.296	4.176	4.030	4.096	10	17	26	L.	8	24	18	21
U.—13th, 09 40	4.137	4.207	4.243	4.363	4.367	4.340	4.377	4.347	4.313	4.317	4.277	4.273	4.226	4.263	4.270	11	05	46	U.	11	25	18	29
L.—13th, 22 05	4.145	4.100	4.085	4.130	4.175	4.240	4.203	4.297	4.418	4.380	4.465	4.375	4.287	4.213	4.183	11	18	11	L.	14	18	18	37
U.—14th, 10 29	4.119	4.125	4.130	4.107	4.082	3.983	3.922	3.997	4.029	4.088	4.225	4.211	4.384	4.554	4.483	12	06	36	U.	16	59	18	44
L.—14th, 22 54	4.274	4.283	4.288	4.314	4.294	4.190	4.116	4.112	4.114	4.088	4.102	4.122	4.133	4.078	4.052	12	19	01	L.	19	26	18	51
U.—15th, 11 18	4.288	4.290	4.342	4.386	4.356	4.244	4.260	4.168	4.180	4.058	3.994	3.936	3.910	3.844	3.842	13	07	26	U.	21	37	18	59
L.—15th, 23 45	4.290	4.320	4.200	4.120	4.030	3.980	4.350	3.960	4.039	4.070	4.140	4.020	3.910	3.920	3.900	13	20	51	L.	23	30	19	06
U.—16th, 12 10	4.170	4.153	4.163	4.137	4.133	4.100	3.960	3.950	3.963	3.980	3.963	6.897	3.880	3.890	3.950	14	09	16	U.	25	04	19	13
L.—17th, 00 36	4.116	4.176	4.166	4.078	4.062	3.928	3.820	3.952	4.002	3.942	3.832	3.792	3.876	3.892	3.918	14	21	41	L.	26	16	19	20
U.—17th, 13 03	3.950	3.878	3.898	3.854	3.892	3.926	3.916	3.890	3.844	3.938	3.948	3.992	4.006	4.060	4.096	15	10	11	U.	27	07	19	28
L.—18th, 01 30	4.660	4.620	4.580	4.555	4.530	4.460	4.370	4.370	4.290	4.360	4.300	4.280	4.300	4.390	4.420	15	22	36	L.	27	36	19	34
U.—18th, 13 59	4.675	4.638	4.598	4.610	4.635	4.703	4.683	4.635	4.666	4.598	4.564	4.516	4.465	4.487	4.436	16	11	01	U.	27	40	19	40
L.—19th, 02 23	4.384	4.410	4.485	4.507	4.482	4.447	4.394	4.365	4.375	4.280	4.204	4.221	4.276	4.378	4.279	16	23	31	L.	27	24	19	47
U.—19th, 14 48	4.333	4.361	4.366	4.365	4.310	4.302	4.260	4.228	4.202	4.208	4.194	4.228	4.258	4.288	4.3 0	17	11	55	U.	26	45	19	54
L.—20th, 03 14	4.470	4.470	4.479	4.489	4.476	4.460	4.451	4.459	4.452	4.401	4.371	4.374	4.357	4.311	4.300	17	23	21	L.	25	47	20	00
U.—20th, 15 39	4.505	4.530	4.555	4.580	4.602	4.609	4.516	4.344	4.233	4.101	3.844	3.950	4.240	4.124	4.198	18	11	46	U.	24	32	20	07
L.—21st, 04 03	4.117	4.102	4.088	4.078	4.075	4.123	4.149	4.145	4.187	4.158	4.135	4.086	4.037	3.924	3.957	19	00	11	L.	22	57	20	13
U.—21st, 16 27	4.174	4.184	4.203	4.191	4.174	4.152	4.249	4.053	4.093	3.974	4.834	3.894	3.927	3.921	3.938	19	12	31	U.	21	11	20	20
L.—22d, 04 48	4.061	4.043	4.058	4.069	4.064	4.036	3.972	3.952	3.960	3.912	3.818	3.878	3.920	3.931	3.918	20	00	56	L	19	09	20	26
U.—22d, 17 10	4.133	4.124	4.113	4.103	4.077	4.020	4.013	4.017	3.993	3.973	3.980	3.980	3.920	3.920	4.007	20	13	16	U.	16	56	20	32
L.—23d, 05 21	4.057	4.007	3.959	3.940	3.916	4.049	3.981	4.030	3.984	3.863	3.948	3.933	3.999	3.950	3.988	21	01	36	L.	14	32	29	38

U.—23d,	17	53	4.040	4.024	4.015	4.009	3.989	3.923	3.895	3.856	3.871	3.936	3.916	4.011	3.990	3.997	3.931	21	14	01	U.	11	59	20	43
L.—24th,	06	14	3.985	4.149	4.132	4.153	4.216	4.193	4.131	4.123	4.031	4.063	4.137	4.101	4.157	4.190	4.167	22	02	21	L.	9	19	20	49
U.—24th,	18	35	4.533	4.630	4.520	4.487	4.460	4.413	4.400	4.517	4.483	4.397	4.437	4.320	4.197	4.350	4.303	22	14	41	U.	6	32	20	54
L.—25th,	06	55	4.280	4.330	4.363	4.350	4.300	4.147	4.113	4.103	4.197	4.243	4.320	4.287	4.260	4.300	4.293	23	03	01	L.	3	40	21	00
U.—25th,	19	15	4.265	4.240	4.230	4.220	4.200	4.170	4.135	4.120	4.115	4.125	4.185	4.265	4.290	4.252	4.225	23	15	21	U. —	0	44	21	05
L.—26th,	07	36	4.546	4.511	4.478	4.448	4.362	4.104	4.166	4.128	3.890	3.904	3.826	3.942	3.952	3.755	3.596	24	03	41	L. +	2	15	21	11
U.—26th,	19	57	4.106	4.118	4.128	4.102	4.067	4.021	3.984	3.926	3.884	4.024	4.184	4.173	4.116	4.182	4.127	24	16	01	U.	5	15	21	16
L.—27th,	08	18	4.336	4.314	4.284	4.263	4.278	4.296	4.324	4.328	4.266	4.248	4.230	4.192	4.186	4.190	4.148	25	04	26	L.	8	15	21	21
U.—27th,	20	40	4.080	4.050	4.040	4.040	4.027	3.980	3.920	3.870	3.890	4.020	4.103	4.003	3.860	3.833	3.843	25	16	46	U.	11	11	21	27
L.—28th,	09	04	4.317	4.342	4.359	4.354	4.342	4.309	4.433	4.446	4.417	4.409	4.482	4.566	4.587	4.581	4.667	26	05	11	L.	14	04	21	32
U.—28th,	21	28	4.958	4.977	4.997	4.987	4.972	4.811	4.632	4.564	4.433	4.355	4.546	4.616	4.545	4.475	4.339	26	17	36	U.	16	48	21	37
L.—29th,	09	55	4.418	4.400	4.385	4.387	4.397	4.367	4.327	4.303	4.342	4.375	4.347	4.310	4.360	4.445	4.443	27	06	01	L.	19	22	21	41
U.—29th,	22	21	4.569	4.548	4.518	4.504	4.514	4.541	4.578	4.506	4.463	4.419	4.409	4.400	4.372	4.409	4.521	27	18	26	U.	21	42	21	46
L.—30th,	10	50	4.523	4.497	4.457	4.430	4.430	4.403	4.410	4.393	4.340	4.413	4.493	4.497	4.483	4.527	4.603	28	06	56	L.	23	44	21	51
U.—30th,	23	20	4.590	4.600	4.537	4.500	4.530	4.560	4.513	4.420	4.357	4.307	4.280	4.263	4.267	4.300	4.263	28	19	26	U.	25	24	21	55
L.—31st,	11	51	....	....	....	....	....	....	....	....	....	....	....	....	.....	....	....	29	07	56	L. +	26	39	+22	00
June, 1859.																									
			4.308	4.306	4.326	4.390	4.284	4.304	4.234	4.246	4.212	4.186	4.240	4.202	4.220	4.266	4.282	....	....	....	....	....	....	....	....
U.—1st,	00h.	23m.	4.651	4.634	4.454	4.397	4.416	4.405	4.270	4.171	4.339	4.279	4.143	3.979	3.961	4.125	4.123	0	11	05	U. +	27	24	+22	04
L.—1st,	12	55	4.753	4.577	4.570	4.603	4.570	4.400	4.420	4.413	4.247	4.073	4.115	4.220	4.227	4.263	3.887	0	23	35	L.	27	38	22	08
U.—2d,	01	27	4.148	4.164	4.122	4.054	4.008	3.986	4.124	3.876	4.066	3.832	3.926	4.004	4.098	4.448	3.934	1	12	10	U.	27	20	22	12
L.—2d,	14	00	4.390	4.430	4.470	4.490	4.510	4.580	4.620	4.550	4.490	4.670	5.030	4.840	4.670	4.850	4.730	2	00	40	L.	26	30	22	16
U.—3d,	02	32	4.785	4.820	4.862	4.952	5.662	4.906	5.133	5.167	. ...	....	5.025	4.951	4.825	4.965	4.979	2	13	10	U.	25	10	22	20
L.—3d,	15	02	4.639	4.769	4.762	4.702	4.645	4.583	4.628	4.598	4.571	4.581	4.472	4.561	4.634	4.676	4.616	3	01	40	L.	23	22	22	24
U.—4th,	03	32	4.599	4.589	4.575	4.540	4.507	4.474	4.523	4.411	4.296	4.378	4.347	4.293	4.193	4.235	4.291	3	14	10	U.	21	09	22	27
L.—4th,	16	00	4.350	4.325	4.300	4.305	4.310	4.260	4.240	4.200	4.120	4.140	4.090	4.090	4.040	4.180	4.230	4	02	40	L.	18	35	22	30
U.—5th,	04	28	4.498	4.461	4.416	4.332	4.242	4.323	4.218	4.173	4.151	4.253	4.381	4.343	4.228	4.201	4.125	4	15	10	U.	15	50	22	34
L.—5th,	16	53	4.484	4.499	4.479	4.451	4.416	4.339	4.343	4.304	4.267	4.283	4.244	4.199	4.167	4.129	4.158	5	03	35	L.	12	48	22	38
U.—6th,	05	18	4.296	4.244	4.264	4.270	4.220	4.150	4.154	4.152	4.188	4.202	4.250	4.278	4.234	4.228	4.216	5	16	00	U.	10	55	22	41
L.—6th,	17	42	4.274	4.266	4.332	4.314	4.278	4.248	4.200	4.146	4.168	4.118	4.106	4.076	4.082	4.038	4.006	6	04	25	L.	6	25	22	44
U.—7th,	06	06	3.914	4.165	3.860	4.098	4.056	4.116	3.900	4.240	4.210	4.034	4.188	4.244	4.238	4.166	4.208	6	16	45	U. +	3	03	22	47
L.—7th,	18	30	4.360	4.360	4.330	4.260	4.290	4.230	4.130	4.070	4.050	4.270	4.420	4.430	4.470	4.270	4.390	7	05	10	L. —	0	12	22	50
U.—8th,	06	53	4.333	4.327	4.409	4.449	4.408	4.369	4.334	4.323	4.291	4.249	4.266	4.289	4.232	4.246	4.237	7	17	35	U.	3	36	22	53
L.—8th,	19	16	4.265	4.255	4.185	4.122	4.157	4.211	4.198	4.181	4.163	4.119	4.111	4.259	4.471	4.411	4.277	8	05	55	L.	6	39	22	55
U.—9th,	07	39	4.502	4.572	4.537	4.432	4.366	4.316	4.321	4.282	4.255	4.272	4.245	4.292	4.338	4.324	4.404	8	18	20	U.	9	44	22	58
L.—9th,	20	02	4.783	4.808	4.835	4.875	4.917	5.011	4.888	4.989	4.805	4.459	4.595	4.664	4.577	4.539	4.657	9	06	40	L.	12	39	23	00
U.—10th,	08	25	4.478	4.480	4.495	4.500	4.500	4.467	4.402	4.415	4.462	4.462	4.393	4.363	4.392	4.392	4.423	9	19	05	U.	15	25	23	03
L.—10th,	20	50	4.237	4.225	4.240	4.253	4.263	4.297	4.230	4.307	4.310	4.273	4.363	4.387	4.463	4.483	4.390	10	07	30	L.	17	58	23	05
U.—11th,	09	14	4.363	4.388	4.409	4.429	4.416	4.381	4.324	4.275	4.289	4.305	4.300	4.286	4.185	4.124	4.031	10	19	55	U.	20	17	23	07
L.—11th,	21	39	4.145	4.170	4.177	4.172	4.176	4.175	4.182	4.282	4.187	4.092	4.065	4.154	4.274	4.269	4.254	11	08	20	L.	22	19	23	09
U.—12th,	10	04	4.196	4.181	4.151	4.081	4.026	4.005	4.017	3.865	3.842	3.941	4.060	3.981	4.117	4.075	3.889	11	20	45	U.	24	01	23	11
L.—12th,	22	30	4.430	4.440	4.450	4.440	4.430	4.550	4.680	4.490	4.430	4.390	4.400	4.400	4.380	4.350	4.340	12	09	10	L.	25	29	23	13
U.—13th,	10	55	4.447	4.443	4.418	4.450	4.510	4.630	4.560	4.570	4.443	4.517	4.475	4.370	4.447	4.573	4.785	12	21	35	U.	26	33	23	15
L.—13th,	23	22	4.302	4.345	4.533	4.683	4.659	4.559	4.304	4.158	4.243	4.297	4.361	4.397	4.367	4.343	4.343	13	10	05	L.	27	15	23	16
U.—14th,	11	50	4.553	4.557	4.620	4.703	4.723	4.537	4.480	4.523	4.397	4.567	4.563	4.573	4.560	4.257	4.390	13	22	30	U.	27	35	23	18
L.—15th,	00	15	3.690	3.990	4.150	4.220	4.190	4.350	4.430	4.520	4.420	4.230	4.200	4.150	4.150	4.070	4.2[illegible]0	14	10	50	L.	27	33	23	19
U.—15th,	12	41	4.535	4.567	4.624	4.625	4.613	4.609	4.556	4.482	4.498	4.435	4.472	4.506	4.483	4.409	4.332	14	23	15	U.	27	10	23	20
L.—16th,	01	07	4.435	4.445	4.450	4.450	4.445	4.423	4.388	4.359	4.385	4.361	4.314	4.241	4.189	4.255	4.391	15	11	40	L.	26	25	23	21
U.—16th,	13	33	4.463	4.478	4.509	4.604	4.676	4.643	4.466	4.431	4.434	4.379	4.363	4.564	4.515	4.476	4.541	16	00	10	U.	25	22	23	22
L.—17th,	01	57	4.872	4.854	4.809	4.788	4.773	4.698	4.636	4.612	4.574	4.408	4.525	4.486	4.471	4.425	4.447	16	12	30	L.	24	00	23	24
U.—17th,	14	21	4.579	4.544	4.479	4.448	4.468	4.508	4.478	4.383	4.357	4.318	4.328	4.392	4.354	4.344	4.336	17	00	55	U.	22	22	23	25
L.—18th,	02	44	4.466	4.451	4.459	4.469	4.479	4.471	4.483	4.455	4.273	4.183	4.211	4.270	4.387	4.439	4.431	17	13	20	L. —	20	30	+23	25

TABLE H 5—Continued.

Date and time of moon's meridian transit. U, upper; L., lower. Astronomical account.	TIME PRECEDING THE MOON'S MERIDIAN TRANSIT AND READING OF TIDE-GAUGE.											Moon in meridian.
	5*h*. 30*m*.	5*h*. 00*m*.	4*h* 30*m*	4*h*. 00*m*.	3*h*. 30*m*.	3*h*. 00*m*.	2*h*. 30*m*	2*h*. 00*m*	1*h* 30*m*.	1*h*. 00*m*.	0*h*. 30*m*.	0
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
June, 1859.												
U.—18th, 15*h* 06*m*	4.402	4.366	4.482	4.431	4.372	4.390	4.442	4.484	4.456	4.448	4.490	4.520
L.—19th, 03 28	4.461	4.367	4.388	4.446	4.347	4.383	4.440	4.382	4.410	4.355	4.509	4.640
U.—19th, 15 50	4.233	4.295	4.300	4.370	4.377	4.373	4.440	4.423	4.427	4.420	4.457	4.530
L.—20th, 04 10	4.310	4.380	4.423	4.487	4.513	4.550	4.573	4.413	4.317	4.220	4.383	4.450
U.—20th, 16 30	4.480	4.390	4.370	4.330	4.380	4.470	4.560	4.490	4.530	4.620	4.590	4.530
L.—21st, 04 50	4.310	4.327	4.323	4.273	4.363	4.387	4.383	4.430	4.250	4.203	4.337	4.450
U.—21st, 17 10	4.377	4.373	4.330	4.320	4.373	4.423	4.387	4.387	4.410	4.413	4.357	4.330
L.—22d, 05 30	4.270	4.260	4.330	4.260	4.220	4.360	4.350	4.390	4.430	4.490	4.370	4.330
U.—22d, 17 51	4.366	4.320	4.322	4.308	4.362	4.390	4.372	4.426	4.358	4.350	4.414	4.490
L.—23d, 06 12	4.482	4.480	4.390	4.380	4.356	4.358	4.354	4.366	4.396	4.384	4.410	4.470
U.—23d, 18 33	4.360	4.442	4.348	4.424	4.438	4.368	4.434	4.446	4.500	4.514	4.622	4.560
L.—24th, 06 55	4.580	4.473	4.460	4.470	4.500	4.470	4.413	4.403	4.557	4.587	4.610	4.630
U.—24th, 19 18	4.292	4.266	4.318	4.338	4.360	4.314	4.308	4.348	4.428	4.448	4.494	4.550
L.—25th, 07 43	4.309	4.329	4.340	4.353	4.361	4.367	4.381	4.392	4.437	4.451	4.418	4.410
U.—25th, 20 08	4.511	4.562	4.564	4.617	4.596	4.664	4.709	4.623	4.531	4.488	4.531	4.560
L.—26th, 08 35	4.250	4.217	4.498	4.295	4.327	4.352	4.373	4.617	4.298	4.547	4.550	4.340
U.—26th, 21 02	4.486	4.433	4.464	4.363	4.128	4.111	4.276	4.357	4.307	4.256	4.198	4.170
L.—27th, 09 32	4.025	3.961	4.069	4.612	4.481	4.225	4.438	4.510	4.366	4.242	4.384	4.580
U.—27th, 22 02	4.159	4.150	4.247	4.252	4.370	4.418	4.385	4.316	4.271	4.428	4.378	4.490
L.—28th, 10 34	4.052	4.016	4.132	4.584	4.355	4.373	4.271	4.337	4.313	4.263	4.241	4.410
U.—28th, 23 06	4.576	5.010	4.394	3.928	4.444	4.264	4.176	4.166	4.174	4.114	4.148	4.160
L.—29th, 11 40	5.000	4.890	4.790	4.910	4.797	4.690	4.753	4.693	4.677	4.810	4.900	4.710
U.—30th, 00 13	4.390	4.647	4.499	4.497	4.476	4.442	4.496	4.587	4.312	4.333	4.331	4.450
L.—30th, 12 45	4.690	4.200	4.280	4.240	4.430	4.390	4.430	4.480	4.370	4.530	....	....
Sums, (dividends)	1230.582	1234.979	1244.259	1249.607	1250.492	1259.580	1266.050	1270.176	1271.876	1275.527	1281.742	1301.340
No. of observations, (divisors)	340	341	343	343	342	343	343	343	342	342	342	346
Mean's, (quotients)	3.6194	3.6216	3.6276	3.6431	3.6564	3.6722	3.6911	3.7031	3.7189	3.7296	3.7478	3.7611
Deduct the readings of tide-gauge for mean low water	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194
Mean co-ordinates of altitude of the lake surface above low water	0.0000	0.0022	0.0082	0.0237	0.0372	0.0528	0.0717	0.0837	0.0995	0.1102	0.1284	0.1417

TABLE H 5—Continued.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIME AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.															Moon's age at time of meridian transit.			Moon's apparent declination at time of her meridian transit. U., upper; L., lower. + north; — south.			Sun's apparent declination at time of moon's meri'n transit. + N.; — S.	
	0h. 30m.	0h. 45m.	1h. 00m.	1h. 15m.	1h. 30m.	2h. 00m.	2h. 30m.	3h. 00m.	3h. 30m.	4h. 00m.	4h. 30m.	5h. 00m.	5h. 30m.	6h. 00m.	6h. 30m.								
	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.								
June, 1859.																d.	h.	m.		°	′	°	′
U.—18th, 15h. 06m.	4.582	4.612	4.620	4.595	4.558	4.474	4.482	4.426	4.318	4.274	4.298	4.306	4.356	4.370	4.358	18	01	40	U.	— 18	+23	+23	26
L.—19th, 03 28	4.500	4.481	4.471	4.440	4.405	4.353	4.387	4.502	4.435	4.402	4.447	4.365	4.315	4.357	4.248	18	14	05	L.	16	08	23	26
U.—19th, 15 50	4.560	4.542	4.537	4.515	4.500	4.383	4.363	4.293	4.400	4.380	4.383	4.377	4.283	4.303	4.297	19	02	25	U.	13	34	23	27
L.—20th, 04 10	4.277	4.407	4.430	4.400	4.383	4.393	4.377	4.223	4.207	4.293	4.330	4.313	4.360	4.443	4.487	19	14	45	L.	11	08	23	27
U.—20th, 16 30	4.570	4.525	4.486	4.465	4.450	4.410	4.460	4.320	4.310	4.360	4.220	4.280	4.200	4.320	4.290	20	03	05	U.	8	28	23	28
L.—21st, 04 50	4.450	4.423	4.403	4.387	4.377	4.397	4.330	4.257	4.280	4.313	4.293	4.247	4.310	4.383	4.330	20	15	25	L.	5	39	23	28
U.—21st, 17 10	4.393	4.413	4.400	4.370	4.353	4.347	4.347	4.307	4.303	4.330	4.273	4.257	4.277	4.230	4.270	21	03	45	U.	2	51	23	28
L.—22d, 05 30	4.390	4.310	4.286	4.350	4.300	4.250	4.280	4.276	4.300	4.270	4.230	4.290	4.340	4.420	4.380	21	16	05	L.	— 0	04	23	27
U.—22d, 17 51	4.424	4.404	4.368	4.368	4.366	4.352	4.358	4.414	4.432	4.400	4.370	4.354	4.338	4.396	4.439	22	04	25	U.	+ 2	58	23	27
L.—23d, 06 12	4.546	4.502	4.458	4.482	4.530	4.584	4.530	4.444	4.476	4.438	4.368	4.390	4.346	4.342	4.298	22	16	45	L.	5	54	23	27
U.—23d, 18 33	4.536	4.530	4.578	4.606	4.590	4.552	4.554	4.596	4.596	4.546	4.478	4.470	4.528	4.414	4.370	23	05	10	U.	8	50	23	26
L.—24th, 06 55	4.540	4.547	4.547	4.560	4.517	4.547	4.467	4.473	4.503	4.400	4.447	4.363	4.405	4.495	4.350	23	17	30	L.	11	41	23	26
U.—24th, 19 18	4.528	4.535	4.510	4.489	4.484	4.474	4.452	4.452	4.43	4.422	4.454	4.422	4.450	4.400	4.316	24	05	55	U.	14	29	23	25
L.—25th, 07 43	4.519	4.564	4.557	4.542	4.501	4.467	4.486	4.463	4.444	4.424	4.373	4.317	4.406	4.427	4.445	24	18	20	L.	17	09	23	24
U.—25th, 20 08	4.458	4.473	4.419	4.304	4.325	4.509	4.407	4.366	4.358	4.391	4.393	4.349	4.406	4.353	4.363	25	06	45	U.	19	38	23	23
L.—26th, 08 35	4.619	4.557	4.505	4.460	4.390	4.205	4.328	4.547	4.427	4.438	4.526	4.275	4.475	4.603	4.598	25	19	10	L.	21	53	23	22
U.—26th, 21 02	4.148	4.134	4.119	4.109	4.097	4.056	3.998	3.949	3.669	3.927	3.887	3.849	3.968	3.949	4.067	26	07	35	U.	23	53	23	21
L.—27th, 09 32	4.451	4.386	4.314	4.194	4.088	4.067	4.181	4.335	4.277	4.375	4.298	4.194	4.247	4.195	4.123	26	20	05	L.	25	29	23	20
U.—27th, 22 02	4.446	4.491	4.527	4.502	4.482	4.515	4.575	4.356	4.303	4.354	4.545	4.445	4.098	4.067	4.032	27	08	35	U.	26	42	23	19
L.—28th, 10 34	4.592	4.492	4.463	4.438	4.409	4.335	4.316	4.397	4.242	4.195	4.249	4.386	4.475	4.364	4.285	27	21	10	L.	27	26	23	17
U.—28th, 23 06	4.082	4.062	4.232	4.687	4.966	4.958	4.794	4.688	4.822	4.661	4.384	4.674	4.838	4.920	4.838	28	09	40	U.	27	39	23	15
L.—29th, 11 40	4.720	4.730	4.637	4.567	4.620	4.577	4.630	4.537	4.453	4.677	4.700	4.570	4.403	4.460	4.473	28	22	15	L.	27	17	23	13
U.—30th, 00 13	4.646	4.722	4.626	4.558	4.446	4.560	4.559	4.485	4.591	4.497	4.451	4.399	4.394	4.486	4.373	0	03	25	U.	26	25	23	12
L.—30th, 12 45	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	0	15	55	L.	+ 25	00	+23	10
Sums, (dividends)	1286.405	1285.788	1280.477	1279.522	1278.095	1273.505	1274.033	1264.454	1257.028	1256.750	1258.420	1248.002	1244.526	1246.255	1238.171								
No. of observations, (divisors)...	342	342	341	341	341	341	342	342	342	343	344	342	342	343	342								
Means (quotients).	3.7614	3.7596	3.7551	3.7542	3.7480	3.7346	3.7252	3.6972	3.6755	3.6640	3.6582	3.6491	3.6390	3.6334	3.6204								
Deduct the readings of tide-gauge for mean low water........	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194	3.6194								
Mean co-ordinates of altitude of the lake surface above low water..	0.1420	0.1402	0.1357	0.1348	0.1286	0.1152	0.1058	0.0778	0.0561	0.0446	0.0388	0.0297	0.0196	0.0140	0.0010								

TABLE H 6.

Investigation of the problem of a lunar tide on Lake Michigan, showing the quarter-hourly co-ordinates of altitude of the surface of Lake Michigan, observed during the twenty-four spring tides given in the text, between January 3 and June 2, 1859.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME PRECEDING THE MOON'S TRANSIT AND READINGS OF TIDE-GAUGE.												
	6*h*. 00*m*.	5*h*. 45*m*.	5*h*. 30*m*.	5*h*. 15*m*.	5*h*. 00*m*.	4*h*. 45*m*.	4*h*. 30*m*.	4*h*. 15*m*.	4*h*. 00*m*.	3*h*. 45*m*.	3*h*. 30*m*.	3*h*. 15*m*.	3*h*. 00*m*.
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.													
L.—3d, 12*h*. 08*m*.	2.311	2.481	2.677	2.897	3.032	3.092	3.125	3.135	3.151	3.171	3.191	3.205	3.221
U.—4th, 00 33	3.184	3.152	3.124	3.148	3.180	3.184	3.200	3.211	3.210	3.160	3.122	3.134	3.170
L.—4th, 12 57	2.836	2.780	2.738	2.738	2.732	2.754	2.760	2.784	2.838	2.834	2.84[illegible]	2.786	2.738
L.—17th, 23 58	3.123	3.094	3.047	3.014	2.958	2.908	2.883	2.889	2.899	2.857	2.850	2.799	2.825
U.—18th, 12 30	2.420	2.450	2.450	2.430	2.420	2.440	2.450	2.410	2.430	2.400	2.440	2.460	2.490
L.—19th, 01 00	2.440	2.480	2.490	2.530	2.580	2.560	2.570	2.590	2.600	2.580	2.630	2.640	2.620
February, 1859.													
U.—2d, 00*h*. 02*m*.	3.417	3.397	3.384	3.413	3.432	3.454	3.485	3.523	3.544	3.577	3.620	3.623	3.639
L.—2d, 12 24	3.768	3.754	3.738	3.736	3.722	3.698	3.708	3.732	3.752	3.766	3.740	3.702	3.678
U.—3d, 00 46	3.541	3.551	3.573	3.612	3.629	3.609	3.603	3.649	3.631	3.639	3.619	3.611	3.631
U.—16th, 12 03	2.990	3.036	3.058	3.042	3.020	3.064	3.082	3.084	3.056	3.040	3.046	3.082	3.134
L.—17th, 00 30	3.120	3.080	3.040	2.950	2.890	2.980	3.050	3.010	3.060	3.060	3.040	3.070	3.050
U.—17th, 12 56	3.158	3.113	3.071	3.075	3.095	3.107	3.125	3.108	3.129	3.169	3.202	3.195	3.153
March, 1859.													
U.—4th, 00*h*. 09*m*.	2.852	2.821	2.834	2.874	2.932	2.972	3.004	3.044	3.078	3.108	3.144	3.166	3.206
L.—4th, 12 30	3.000	3.080	3.050	3.090	3.130	3.060	3.060	3.090	3.180	3.100	3.140	3.110	3.100
U.—5th, 00 50	3.040	3.030	3.047	3.033	3.023	3.033	3.040	3.047	3.067	3.080	3.090	3.103	3.103
L.—20th, 01 33	3.028	3.016	3.006	3.028	3.024	3.036	3.022	3.046	3.122	3.180	3.216	3.184	3.110
April, 1859.													
U.—16th, 11*h*. 47*m*.	3.605	3.629	3.557	3.533	3.485	3.447	3.434	3.461	3.473	3.495	3.523	3.480	3.476
L.—17th, 00 11	3.565	3.589	3.622	3.681	3.744	3.789	3.859	3.865	3.919	3.933	3.952	3.975	4.017
U.—17th, 12 35	3.910	3.873	3.833	3.823	3.813	3.770	3.753	3.750	3.723	3.720	3.740	3.757	3.797
May, 1859.													
T.—2d, 12*h*. 08*m*.	4.169	4.166	4.169	4.144	4.130	4.111	4.111	4.136	4.171	4.185	4.196	4.247	4.269

U.—16th, 12 10	3.927	3.967	4.067	4.060	4.083	4.163	4.125	4.018	4.013	4.017	3.997	3.970	4 040
L.—31st, 11 51	4.262	4.266	4.290	4.310	4.336	4.342	4.310	4.294	4.278	4.318	4.376	4.408	4.420
June, 1859.													
U.—1st, 00*h*. 23*m*....	4.279	4.302	4.319	4.283	4.276	4.285	4.301	4.293	4.286	4.279	4.271	4.280	4.259
L.—1st, 12 55	4.113	4.123	4.260	4.347	4.287	4.203	4.193	4.287	4.383	4.350	4.267	4.260	4.343
Totals	80.058	80.230	80.444	80.811	80.953	81.081	81.253	81.451	81.993	82.018	82.267	82.247	82.489
Means	3.3357	3.3429	3.3518	3.3671	3.3730	3.3784	3.3855	3.3938	3.4164	3.4174	3.4278	3.4269	3.4370
Readings of tide gauge at mean low water at spring tides ...	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357
Mean co-ordinates of altitude at spring tides	0.0000	0.0072	0.0161	0.0314	0.0373	0.0427	0.0498	0.0581	0.0807	0.0817	0.0921	0.0912	0.1013

TABLE H 6—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME PRECEDING THE MOON'S TRANSIT AND READINGS OF TIDE-GAUGE.											Moon in meridian.
	2*h.* 45*m.*	2*h.* 30*m.*	2*h.* 15*m.*	2*h.* 00*m.*	1*h.* 45*m.*	1*h.* 30*m.*	1*h.* 15*m.*	1*h.* 00*m.*	0*h.* 45*m.*	0*h.* 30*m.*	0*h.* 15*m.*	0
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.												
L.—3d, 12*h.* 08*m*	3.241	3.261	3.275	3.275	3.275	3.280	3.291	3.311	3.315	3.346	3.376	3.410
U.—4th, 00 33	3.258	3.284	3.256	3.256	3.316	3.310	3.356	3.374	3.350	3.340	3.278	3.250
L.—4th, 12 57	2.786	2.832	2.864	2.830	2.852	2.876	2.904	2.934	2.940	2.908	2.940	2.940
L.—17th, 23 58	2.821	2.820	2.837	2.814	2.827	2.804	2.774	2.787	2.807	2.827	2.761	2.790
U.—18th, 12 30	2.500	2.530	2.520	2.550	2.560	2.590	2.610	2.630	2.650	2.680	2.690	2.720
L.—19th, 01 00	2.600	2.630	2.610	2.630	2.640	2.650	2.710	2.780	2.820	2.700	2.840	2.860
February, 1859.												
U.—2d, 00*h.* 02*m*	3.683	3.655	3.697	3.741	3.754	3.779	3.771	3.777	3.761	3.773	3.798	3.850
L.—2d, 12 24	3.688	3.718	3.742	3.720	3.718	3.705	3.672	3.672	3.686	3.684	3.662	3.630
U.—3d, 00 46	3.641	3.651	3.670	3.669	3.652	3.677	3.641	3.651	3.661	3.671	3.679	3.660
U.—16th, 12 03	3.144	3.130	3.176	3.208	3.232	3.206	3.232	3.250	3.286	3.272	3.284	3.300
L.—17th, 00 30	3.080	3.080	3.100	3.100	3.070	3.050	3.000	2.970	3.070	3.100	3.090	3.100
U.—17th, 12 56	3.147	3.165	3.214	3.245	3.228	3.220	3.235	3.255	3.297	3.303	3.278	3.290
March, 1859.												
U.—4th, 00*h.* 09*m*	3.236	3.276	3.312	3.296	3.292	3.282	3.282	3.260	3.384	3.414	3.418	3.300
L.—4th, 12 30	3.160	3.180	3.170	3.190	3.230	3.200	3.180	3.130	3.150	3.150	3.190	3.240
U.—5th, 00 50	3.130	3.137	3.140	3.130	3.167	3.190	3.170	3.163	3.150	3.163	3.190	2.210
L.—20th, 01 33	3.086	3.162	3.214	3.230	3.174	3.150	3.154	3.174	3.202	3.250	3.254	3.270
April, 1859.												
U.—16th, 11*h.* 47*m*	3.453	3.478	3.529	3.516	3.494	3.525	3.557	3.544	3.579	3.643	3.663	3.680
L.—17th, 00 11	4.008	3.978	3.970	4.007	4.042	4.072	4.073	4.070	4.092	4.093	4.075	4.100
U.—17th, 12 35	3.803	3.803	3.827	3.833	3.853	3.840	3.847	3.870	3.907	3.933	3.913	3.940
May, 1859.												
L.—2d, 12*h.* 08*m*	4.265	4.281	4.274	4.276	4.301	4.321	4.298	4.275	4.291	4.305	4.326	4.340
U.—16th, 12 10	4.107	4.120	4.107	4.093	4.110	4.147	4.153	4.123	4.157	4.207	4.207	4.170
L.—31st, 11 51	4.408	4.386	4.400	4.418	4.384	4.352	4.356	4.384	4.366	4.368	4.334	4.330

June, 1859.											
U.—1st, 00*h*. 23*m*.	4.929	4.225	4.251	4.302	4.357	4.391	4.437	4.481	4.426	4.306	4.261	4 340
L.—1st, 12 55	4.427	4.410	4.370	4.407	4.583	4.713	4.853	4.890	4.907	4.960	4.993	4.930
Totals	82.851	83.192	83.525	83.726	84.111	84.331	84.556	84.755	85 274	85.466	85 510	85.650
Means	3.4521	3.4663	3.4802	3.4886	3.5016	3.5138	3.5232	3.5314	3.5531	3.5619	3.5629	3.5687
Readings of tide-gauge at mean low water at spring tides	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357
Mean co-ordinates of altitude at spring tides	0.1164	0 1306	0.1445	0.1529	0.1689	0.1781	0.1875	0.1957	0.2174	0.2262	0.2272	0.2330

TABLE H 6—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME AFTER THE MOON'S MERIDIAN TRANSIT, AND READINGS OF TIDE-GAUGE.													
	0h. 15m.	0h. 30m.	0h. 45m.	1h. 00m.	1h. 15m.	1h. 30m.	1h. 45m.	2h. 00m.	2h. 15m.	2h. 30m.	2h. 45m.	3h. 00m.	3h. 15m.	3h 30m.
	Feet and deci'ls.	Feet and deci'ls	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.
January, 1859.														
L.—3d, 12h. 08m.	3.471	3.501	3.521	3.519	3.505	3.484	3.454	3.429	3.415	3.405	3.389	3.369	3.360	3.344
U.—4th, 00 33	3.204	3.264	3.272	3.232	3.204	3.222	3.224	3.190	3.140	3.076	2.962	2.916	3.026	3.060
L—4th, 12 57	2.998	3.026	3.014	3.074	3.074	3.046	3.072	3.096	3.116	3.128	3.154	3.208	3.212	3.186
L—17th, 23 58	2.826	2.873	2.759	2.763	2.738	2.834	2.781	2.692	2.697	2.683	2.585	2.475	2.425	2.368
U.—18th, 12 30	2.720	2.740	2.760	2.770	2.800	2.810	2.830	2.810	2.780	2.740	2.730	2.700	2.680	2.610
L.—19th, 01 00	2.930	2.980	2.980	2.890	2.950	2.940	2.940	2.910	2.930	2.890	2.870	2.840	2.810	2.800
February, 1859.														
U.—2d, 00h. 02m.	3.875	3.913	3.937	3.914	3.943	3.963	3.977	3.961	3.969	3.965	4.005	4.032	3.976	3.945
L.—2d, 12 24	3.658	3.688	3.706	3.686	3.658	3.668	3.668	3.636	2.614	3.598	3.566	3.568	3.592	3.618
U—3d, 00 46	3.688	3.653	3.621	3.636	3.649	3.639	3.630	3.635	3.639	3.629	3.619	3.601	3.589	3.579
U.—16th, 12 03	3.331	3.298	3.318	3.274	3.280	3.248	3.276	3.252	3.216	3.198	3.182	3.154	3.160	3.112
L.—17th, 00 30	3.120	3.120	3.100	3.150	3.210	3.220	3.220	3.270	3.240	3.260	3.230	3.230	3.210	3.200
U.—17th, 12 56	3.309	3.327	3.306	3.285	3.243	3.245	3.228	3.176	3.175	3.187	3.168	3.094	3.055	3.079
March, 1859.														
U.—4th, 00h. 08m.	3.150	3.078	3.148	3.194	3.118	3.100	3.168	3.182	3.146	3.112	3.070	3.038	3.012	3.030
L—4th, 12 30	3.220	3.210	3.189	3.210	3.190	3.150	3.260	3.230	3.230	3.190	3.170	6.140	3.170	3.120
U.—5th, 00 50	3.237	3.213	3.190	3.160	3.140	3.133	3.120	3.107	3.087	3.097	3.083	3.060	3.027	3.017
L.—20th, 01 33	3.316	3.308	3.310	3.286	3.280	3.316	3.306	3.318	3.260	3.222	3.224	3.208	3.238	3.226
April, 1859.														
U.—16th, 11h. 47m.	3.747	3.730	3.726	3.696	3.673	3.682	3.696	3.588	3.514	3.535	3.507	3.545	3.513	3.525
L.—17th, 00 11	4.120	4.135	4.147	4.121	4.103	4.100	4.115	4.091	4.095	4.107	4.088	4.051	4.062	4.033
U.—17th, 12 35	3.910	3.877	3.853	3.850	3.830	3.820	3.787	3.753	3.757	3.777	3.733	3.693	3.690	3.707
May, 1859.														
L.—2d, 12h 08m.	4.327	4.331	4.324	4.294	4.296	4.299	4.290	4.285	4.253	4.225	4.236	4.239	4.214	4.221
U.—16th, 12 10	4.183	4.170	4.153	4.163	4.137	4.133	4.127	4.100	4.057	3.960	3.940	3.950	3.937	3.963
L.—31st, 11 51	....	....	....	....	....	....	....	....	....	....	....	....	....	....

June, 1859.														
....	4.333	4.308	4.306	4.326	4 300	4.284	4.320	4.304	4.260	4.234	4.252	4.246	4.206	4.212
U.—1st, 00*h*. 23*m*.... ....,	4 481	4.651	4.634	4.454	4.397	4.436	4.381	4.405	4.411	4.270	4.173	4.171	4.275	4.339
L.—1st, 12 55	4.893	4.753	4.577	4.570	4.603	4.570	4.490	4.400	4.403	4.420	4.447	4.413	4.317	4 247
Totals	86.039	86 137	85.854	85.537	85.321	85.342	85.290	84.820	84.404	83.908	83.383	82.944	82.756	82.571
Means	3.5849	3.5890	3.5772	3.5640	3.5550	3.5559	3.5537	3.5342	3.5168	3.4962	3.4743	3.4560	2.4482	3.4404
Readings of tide gauge at mean low water at spring tides....	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357
Mean co-ordinates of altitude at spring tides........	0.2492	0.2533	0.2415	6.2283	0.2193	0.2202	0.2180	0.1985	0.1811	0.1605	0.1386	0.1203	0.1125	0.1047

TABLE H 6—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME AFTER THE MOON'S MERIDIAN TRANSIT, AND READINGS OF TIDE-GAUGE.												Moon's age at time of meridian transit.	Moon's apparent declination at time of her meridian transit, + north; — south.	Sun's apparent declination at time of moon's meridian transit. + N.; — S.
	3h. 45m.	4h. 00m.	4h. 15m.	4h. 30m.	4h. 45m.	5h. 00m.	5h. 15m.	5h. 30m.	5h. 45m.	6h. 00m.	6h. 15m.	6h. 30m.			
	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	Feet and deci'ls.	d. h. m.	° '	° '
January, 1859.															
L.—3d, 12h. 08m..	3.325	3.309	3.305	3.305	3.284	3.259	3.245	3.245	3.261	3.249	3.209	3.174	0 00 35	L. — 26 27	—22 47
U.—4th, 00 33 ..	3.072	2.954	2.911	2.872	3.000	2.982	2.888	2.784	2.748	2.868	2.884	2.810	0 12 58	U. 25 18	22 44
L.—4th, 12 57 ..	3.220	3.206	3.184	3.172	3.146	3.156	3.152	3.126	3.112	3.062	3.034	3.022	1 01 22	L. — 23 47	22 41
L.—17th, 23 58 ..	2.308	2.239	2.213	2.314	2.356	2.332	2.313	2.336	2.349	2.378	2.389	2.416	14 12 25	L. + 24 01	20 33
U.—18th, 12 30 ..	2.620	2.610	2.580	2.560	2.560	2.540	2.530	2.510	2.470	2.460	2.430	2.440	15 00 57	U. 21 54	20 26
L.—19th, 01 00 ..	2.780	2.800	2.810	2.820	2.820	2.800	2.760	2.790	2.800	2.800	2.810	2.830	15 13 27	L. + 19 16	—20 20
February, 1859.															
U.—2d, 00h. 02m..	3.905	3.865	3.827	3.814	3.837	3.821	3.826	3.799	3.793	8.806	3.777	3.759	29 12 29	U. — 19 20	—16 48
L.—2d, 12 24 ..	3.648	3.654	3.644	3.622	3.616	3.602	3.578	3.552	3.534	3.524	3.532	3.546	0 04 09	L. 17 05	16 39
U.—3d, 00 46 ..	3.571	3.586	3.599	3.589	3.579	3.564	3.550	3.555	3.561	3.571	3.579	3.559	0 16 31	U. — 14 40	16 30
U.—16th, 12 03 ..	3.084	3.112	3.168	3.210	3.235	3.194	3.174	3.178	3.126	3.106	3.096	3.112	14 03 38	U. + 13 25	12 09
L.—17th, 00 30 ..	3.200	3.210	3.180	3.200	3.160	3.130	3.160	3.170	3.130	3.140	3.180	3.150	14 16 05	L. 10 03	11 58
U.—17th, 12 56 ..	3.097	3.078	3.107	3.142	3.143	3.155	3.153	3.172	3.202	3.203	3.171	3.136	15 04 30	U. + 6 37	—11 47
March, 1859.															
U.—4th, 00h 09m..	3.020	2.982	3.000	3.050	3.088	3.118	3.112	3.082	3.058	3.038	3.012	3.048	29 15 29	U. — 5 29	— 6 27
L.—4th, 12 30 ..	3.140	3.130	3.120	3.100	3.100	3.150	3.130	3.090	3.110	3.090	3.020	3.020	0 11 10	L. — 2 30	6 15
U.—5th, 00 50 ..	3.040	3.027	3.040	3.033	3.027	3.047	3.060	3.057	3.060	3.073	3.070	3.090	0 23 30	U + 0 23	6 02
L.—20th, 01 33 ..	3.214	3.236	3.264	3.274	3.241	3.216	3.192	3.156	3.136	3.115	3.088	3.061	16 00 10	L. + 13 2	— 0 07
April, 1859.															
U.—16th, 11h. 47m..	3.491	3.493	3.446	3.416	3.394	3.424	3.455	3.487	3.478	3.537	3.577	3.565	13 19 18	U. — 13 25	+10 18
L.—17th, 00 11 ..	4.005	3.985	4.002	3.973	3.923	3.895	3.875	3.892	4.003	3.981	3.931	3.898	14 07 43	L. 16 24	10 29
U.—17th, 12 35 ..	3.690	3.660	3.638	3.633	3.640	3.617	3.583	3.580	3.613	3.633	3.630	3.660	14 20 08	U. — 18 58	+10 40
May, 1859.															
L.—2d, 12h. 08m..	4.235	4.209	4.174	4.160	4.160	4.185	4.206	4.201	4.179	4.154	4.135	4.141	0 08 16	L. + 21 33	+15 32
U.—16th, 12 10 .	3.993	3.980	3.983	3.963	3.923	3.897	3.897	3.880	3.870	3.890	3.913	3.960	14 09 16	U. — 25 04	19 13
L.—31st, 11 51 .	....	....	....	....	....	....	....	....	....	....	....	....	29 07 56	L. + 26 39	+22 00

June, 1859.															
....	4.214	4.186	4.200	4.210	4.228	4.202	4.194	4.220	4.258	4.266	4.272	4.282	....	....	....
U.—1st, 00*h*. 22*m*..	4.314	4.279	4.212	4.143	4.051	3.979	3.954	3.961	4.017	4.125	4.174	4.123	0 11 05	U. + 27 24	+22 04
L.—1st, 12 55 ..	4.183	4.073	4.090	4.115	4.143	4.220	4.253	4.227	4.250	4.263	4.167	3.887	0 23 35	L. + 27 38	+22 08
Totals	82.369	81.863	81.697	81.720	81.657	81.485	81.240	81.053	81.118	81.332	81.080	80.689			
Means	3.4320	3.4109	3.4040	3.4050	3.4024	3.3952	3.3850	3.3772	3.3799	3.3888	3.3783	3.3620			
Readings of tide-gauge at mean low water at spring tides..............	3.3357	3.3357	3 3357	3.3357	3.3357	3 3357	3.3357	3.3357	3.3357	3.3357	3.3357	3.3357			
Mean co-ordinates of altitude at spring tides..............	0.0963	0,0752	0.0683	0.0693	0.0667	0.0595	0.0493	0.0415	0.0442	0.0531	0.0426	0.0263			

J. D. GRAHAM, *Colonel Corps of Engineers.*

OFFICE GENERAL SUPERINTENDENCE OF LAKE HARBOR WORKS, *October* 21, 1863.

TABLE H 7.

Investigation of the problem of a lunar tide in Lake Michigan, showing the quarter-hourly co-ordinates of altitude of the surface of Lake Michigan, observed during the twenty-six spring tides mentioned in the text, between January 3 and June 30, 1859.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME PRECEDING THE MOON'S TRANSIT AND READINGS OF TIDE-GAUGE.												
	6*h*. 00*m*.	5*h*. 45*m*.	5*h*. 30*m*.	5*h*. 15*m*.	5*h*. 00*m*.	4*h*. 45*m*.	4*h*. 30*m*.	4*h*. 15*m*.	4*h*. 00*m*.	3*h*. 45*m*.	3*h*. 30*m*.	3*h*. 15*m*.	3*h*. 00*m*.
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.													
U.—4th, 00*h*. 33*m*............	3.184	3.152	3.124	3.148	3.180	3.184	3.200	3.211	3.210	3.160	3.122	3.134	3.170
L.—4th, 12 57	2.836	2.780	2.738	2.738	2.732	2.754	2.760	2.784	2.838	2.834	2.846	2.786	2.738
U.—18th, 12 30	2.420	2.450	2.450	2.430	2.420	2.440	2.450	2.410	2.430	2.400	2.440	2.460	2.490
L.—19th, 01 00	2.440	2.480	2.490	2.530	2.580	2.560	2.570	2.590	2.600	2.580	2.630	2.640	2.620
U.—19th, 13 28	2.827	2.839	2.849	2.850	2.859	2.877	2.889	2.907	2.910	2.919	2.937	2.949	2.950
February, 1859.													
U.—2d, 00*h*. 02*m*............	3.417	3.397	3.384	3.413	3.432	3.454	3.485	3.523	3.544	3.577	3.620	3.623	3.639
U.—16th, 12 03	2.990	3.036	3.058	3.042	3.020	3.064	3.082	3.084	3.056	3.040	3.046	3.082	3.134
U.—17th, 12 56	3.158	3.113	3.071	3.073	3.095	3.107	3.125	3.108	3.129	3.169	3.202	3.195	3.153
L.—18th, 01 20	3.130	3.137	3.133	3.147	3.163	3.177	3.193	3.183	3.130	3.073	3.060	3.117	3.167
March, 1859.													
U.—5th, 00*h*. 50*m*............	3.040	3.030	3.047	3.033	3.023	3.033	3.040	3.047	3.067	3.080	3.090	3.103	3.103
L.—19th, 00 45	3.090	3.090	2.935	2.780	2.885	2.990	3.110	3.230	3.255	3.280	3.315	3.350	3.385
U.—19th, 13 09	2.940	2.935	2.958	2.952	2.916	2.935	2.984	3.018	3.042	3.050	3.062	3.052	3.058
L.—20th, 01 33	3.028	3.016	3.006	3.028	3.024	3.036	3.022	3.046	3.122	3.180	3.216	3.184	3.110
April, 1859.													
L.—3d, 12*h*. 35*m*............	3.300	3.390	3.480	3.433	3.370	3.337	3.410	3.477	3.560	3.577	3.480	3.487	3.553
L.—17th, 00 11	3.565	3.589	3.622	3.681	3.744	3.789	3.859	3.865	3.919	3.933	3.952	3.975	4.017
U.—17th, 12 35	3.910	3.873	3.833	3.823	3.813	3.770	3.753	3.750	3.723	3.720	3.740	3.757	3.797
L.—18th, 01 00	3.630	3.680	3.690	3.650	3.630	3.630	3.650	3.690	3.740	3.720	3.770	3.790	3.790
May, 1859.													
L.—2d, 12*h*. 08*m*............	4.169	4.166	4.169	4.144	4.130	4.111	4.111	4.136	4.171	4.185	4.198	4.247	4.269
U.—3d, 00 36	4.138	4.134	4.118	4.134	4.148	4.148	4.126	4.116	4.102	4.090	4.098	4.122	4.152

L.—3d, 13 05	4.127	4.120	4.123	4.120	4.113	4.130	4.093	4.093	4.117	4.127	4.163	4.193	4.237
L.—17th, 00 36	3.944	3.988	4.012	4.018	3.988	3.994	4.038	4.058	4.070	4.086	4.098	4.081	4.102
L.—18th, 01 30	4.090	4.120	4.140	4.180	4.130	4.150	4.150	4.190	4.220	4.200	4.259	4.2.0	4.270
June, 1859.													
L.—1st, 12*h*. 55*m*	4.113	4.123	4.260	4.347	4.287	4.203	4.193	4.287	4.383	4.350	4.267	4.280	4.343
U.—15th, 12 41	4.189	4.195	4.307	4.306	4.305	4.325	4.264	4.308	4.369	4.299	4.233	4.132	4.137
L.—16th, 01 07	4.324	4.312	4.313	4.373	4.428	4.343	4.275	4.261	4.221	4.332	4.361	4.298	4.273
U.—30th, 00 13	4.465	4.399	4.399	4.425	4.617	4.576	4.499	4.533	4.497	4.455	4.476	4.404	4.442
Totals	90.484	90.541	90.700	90.800	91.062	91.118	91.331	91.905	92.425	92.416	92.670	92.674	93.099
Means	3.4801	3.4824	3.4864	3.4923	3.5023	3.5045	3.5127	3.5348	3.5548	3.5544	3.5642	3.5643	3.5807
Deduct reading of tide-gauge at mean low water of spring tides............	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801
Mean co-ordinates of altitude at spring tides.............	0.0000	0.0023	0.0063	0.0122	0.0222	0.0244	0.0326	0.0547	0.0747	0.0743	0.0841	0.0842	0.1006

TABLE II 7—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME PRECEDING THE MOON'S TRANSIT AND READINGS OF TIDE-GAUGE.											Moon in meridian.
	2h. 45m.	2h. 30m.	2h. 15m.	2h. 00m.	1h. 45m.	1h. 30m.	1h. 15m.	1h. 00m.	0h. 45m.	0h. 30m.	0h. 15m.	0
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1839.												
U.—4th, 00h. 33m..........	3.258	3.284	3.256	3.256	3.316	3.310	3.356	3.374	3.350	3.340	3.288	3.250
L.—4th, 12 57	2.786	2.832	2.864	2.830	2.852	2.876	2.904	2.934	2.940	2.9 8	2.910	2.910
U.—18th, 12 30	2.500	2.530	2.520	2.550	2.550	2.599	2.610	2.630	2.650	2.680	2.690	2.720
L.—19th, 01 00	2.600	2.630	2.610	2.630	2.640	2.650	2.710	2.780	2.820	2.790	2.840	2.860
U.—19th, 13 28	2.967	2.937	2.999	3.009	2.993	2.981	2.989	2.973	2.970	2.961	2.943	2.930
February, 1839.												
U.—2d, 00h. 02m..........	3.633	3.655	3.697	3.741	3.751	3.779	3.771	3.777	3.761	3.773	3.798	3.850
U.—16th, 12 03	3.144	3.130	3.176	3.208	3.232	3.206	3.232	3.250	3.286	3.272	3.284	3.309
U.—17th, 12 56	3.147	3.165	3.214	3.245	3.228	3.220	3.235	3.255	3.297	3.303	3.278	3.290
L.—18th, 01 20	3.183	3.133	3.097	3.093	3.117	3.157	3.183	3.190	3.170	3.227	3.280	3.370
March, 1859.												
U.—5th, 00h. 50m..........	3.130	3.137	3.140	3.130	3.167	3.190	3.170	3.163	3.150	3.163	3.190	3.210
L.—19th, 00 45	3.420	3.402	3.385	3.368	3.350	3.225	3.100	3.235	3.370	3.345	3.320	3.300
U.—19th, 13 09	3.082	3.114	3.130	3.112	3.112	3.108	3.088	3.092	3.118	3.148	3.136	3.140
L.—20th, 01 33	3.085	3.162	3.214	3.220	3.174	3.150	3.154	3.174	3.202	3.250	3.251	3.270
April, 1859.												
L.—3d, 12h. 35m..........	3.607	3.640	3.627	3.697	3.750	3.737	3.607	3.553	3.577	3.663	3.683	3.710
L.—17th, 00 11	4.008	3.978	3.970	4.007	4.042	4.072	4.073	4.070	4.092	4.093	4.075	4.100
U.—17th, 12 35	3.803	3.803	3.827	3.833	3.853	3.840	3.847	3.870	3.907	3.933	3.913	3.940
L.—18th, 01 00	3.760	3.770	3.780	3.750	3.780	3.770	3.810	3.790	3.800	3.820	3.780	3.740
May, 1859.												
L.—2d, 12h. 08m..........	4.265	4.281	4.274	4.276	4.301	4.321	4.298	4.275	4.291	4.305	4.326	4.340
U.—3d, 00 36	4.170	4.186	4.206	4.192	4.192	4.218	4.242	4.248	4.214	4.190	4.182	4.150
L.—3d, 13 05	4.220	4.230	4.300	4.317	4.287	4.247	4.260	4.250	4.237	4.263	4.295	4.310
L.—17th, 00 36	4.124	4.118	4.100	4.092	4.096	4.128	4.140	4.136	4.142	4.136	4.055	3.950
L.—18th, 01 30	4.300	4.330	4.310	4.370	4.370	4.350	4.410	4.430	4.510	4.500	4.615	4.640

June, 1859.												
L.—1st, 12*h*. 55*m*.	4.427	4.410	4.370	4.407	4.583	4.713	4.853	4.890	4.907	4.960	4.993	4.930
U.—15th, 12 41	4.319	4.343	4.323	4.276	4.289	4.337	4.379	4.375	4.370	4.407	4.501	4.480
L.—16th, 01 07	4.333	4.375	4.357	4.339	4.415	4.481	4.493	4.511	4.491	4.496	4.531	4.510
U.—30th, 00 13	4.467	4.496	4.613	4.587	4.441	4.342	4.295	4.333	4.279	4.331	4.375	4.450
Totals	93.739	94.121	94.359	94.535	94.894	95.038	95.209	95.658	95.901	96.347	96.565	96.670
Means	3.6053	3.6200	3.6291	3.6359	3.6498	3.6513	3.6618	3.6791	3.6884	3.7056	3.7140	3.7180
Deduct reading of tide-gauge at mean low water of spring tides	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801
Mean co-ordinates of altitude at spring tides	0.1252	0.1399	0.1490	0.1558	0.1697	0.1752	0.1817	0.1990	0.2083	0.2255	0.2339	0.2379

TABLE H 7—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME AFTER THE MOON'S MERIDIAN TRANSIT, AND READINGS OF TIDE-GAUGE.													
	0*h*. 15*m*.	0*h*. 30*m*.	0*h*. 45*m*.	1*h*. 00*m*.	1*h*. 15*m*.	1*h*. 30*m*.	1*h*. 45*m*.	2*h*. 00*m*.	2*h*. 15*m*.	2*h*. 30*m*.	2*h*. 45*m*.	3*h*. 00*m*.	3*h*. 15*m*.	3*h*. 30*m*.
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.														
U.—4th, 00*h*. 33*m*.	3.204	3.264	3.272	3.232	3.204	3.222	3.224	3.190	3.140	3.076	2 962	2.916	3.026	3.060
L.—4th, 12 57	2.998	3.026	3.014	3.074	3.074	3.046	3.072	3.096	3.116	3.128	3.154	3.208	3.213	3.186
U.—18th, 12 30	2.720	2.740	2.760	2.770	2.800	2.810	2.830	2.810	2.780	2.740	2.730	2.700	2.680	2.640
L.—19th, 01 00	2.930	2.980	2.980	2.890	2.950	2 940	2.940	2 910	2.930	2.890	2.870	2.840	2.810	2.800
U.—19th, 13 28	2.903	2.887	2.872	2.857	2.842	2.823	2.811	2.888	2.865	2.843	2.831	2.804	2.791	2.773
February, 1859.														
U.—2d, 00*h*. 02*m*.	3.875	3.913	3.927	3.914	3.943	3.963	3.977	3.961	3.969	3.965	4.005	4.032	3.976	3.945
U.—16th, 12 03	3.334	3.298	3.318	3.274	3.280	3.248	3.276	3.252	3.216	3.198	3.182	3.154	3.160	3.112
U.—17th, 12 56	3 309	3.327	3.308	3.285	3.243	3.245	3.228	3.176	3.175	3.187	3.168	3.094	3.055	3.079
L.—18th, 01 20	3.373	3.387	3.393	3.387	3.413	3.480	3.580	3.543	3.447	3.340	3.280	3.247	3.273	3.317
March, 1859.														
U.—5th, 00*h*. 50*m*.	3.227	3.213	3.190	3.160	3.140	3.133	3.120	3.107	3.087	3.097	3.083	3.060	3.027	3.017
L.—19th, 00 45	3.360	3.290	3.230	3.120	3.100	3.240	3.200	3.150	3.130	3.100	3.070	3.000	3.030	3.000
U.—19th, 13 09	3.128	3.102	3.084	3.098	3.122	3.112	3.112	3.120	3.102	3.066	3.056	3.072	3.080	3.086
L.—20th, 01 33	3.316	3.308	3.330	3.286	3.280	3.316	3.306	3.318	3.260	3.222	3.224	3.208	3.238	3.226
April, 1859.														
L.—3d. 12*h*. 35*m*.	3.757	3.707	3.667	3.700	3.720	3.667	3.623	3 563	3.503	3.510	3.577	3.617	3.520	3.397
L.—17th, 00 11	4.120	4.135	4.147	4 121	4.103	4 100	4.115	4.091	4.095	4.107	4.088	4.051	4 062	4.033
U.—17th, 12 35	3.910	3.877	3 853	3.850	3.830	3.820	3.787	3.753	3.757	3.777	3.733	3.693	3 690	3.707
L.—18th, 01 00	3.710	3.670	3.630	3.640	3.620	3.600	3.650	3.680	3.690	3.670	3.630	3.630	3.600	3.580
May, 1859.														
L.—2d, 12*h*. 08*m*.	4.327	4.331	4.324	4.294	4.296	4.299	4.290	4.285	4.253	4.225	4 236	4.239	4.214	4.221
U.—3d, 00 38	4.174	4.206	4.180	4.146	4.132	4.112	4.108	4.116	4.110	4.106	4 096	4.094	4.108	4.108
L.—3d, 13 05	4.287	4.263	4.283	4.310	4.317	4.317	4.287	4.260	4.227	4.250	4.270	4.263	4.233	4.193
L.—17th, 00 36	4.058	4.116	4.176	4.166	4.078	4.062	3.996	3.928	3.848	3.820	3 878	4.952	4.012	4.003
L.—18th, 01 30	4.650	4.660	4.620	4.580	4.555	4.530	4.495	4.460	4.415	4.370	4.370	4.370	4.330	4.290

June, 1859.														
L.—1st, 12*h*. 55*m*.	4.893	4.753	4 577	4.570	4.603	4.570	4.490	4.400	4.403	4.420	4.447	4.413	4.317	4.247
U.—15th, 12 41	4.537	4.535	4.567	4.624	4.625	4.613	4.647	4.609	4.597	4.556	4.481	4.482	4.512	4.498
L.—16th, 01 07	4.452	4.435	4.445	4 450	4.450	4.445	4.435	4.423	4.408	4.388	4.363	4.359	4.379	4.885
U.—30th, 00 13	4.485	4.646	4.722	4.626	4.558	4.446	4.430	4.560	4.615	4.559	4 576	4.485	4.522	4.591
Totals	97.037	97.069	96.889	96.424	96.278	96.159	96.029	95.649	95.138	94.610	94.360	93.983	93.857	93.493
Means	3.7321	3.7334	3.7265	3.7086	3.7030	3.6984	3.6934	3.6788	3.6591	3.6388	3.6292	3.6147	3.6098	3.5958
Deduct reading of tide gauge at mean low water of spring tides	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801
Mean co-ordinates of altitude at spring tides	0.2520	0.2533	0.2464	0.2285	0.2229	0.2183	0.2133	0.1987	0.1790	0.1587	0.1491	0.1346	0.1297	0.1157

TABLE H 7—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME AFTER THE MOON'S MERIDIAN TRANSIT, AND READINGS OF TIDE-GAUGE. 3h. 45m.	4h. 00m.	4h. 15m.	4h. 30m.	4h. 45m.	5h. 00m.	5h. 15m.	5h. 30m.	5h. 45m.	6h. 00m.	6h. 15m.	6h. 30m.	Moon's age at time of meridian transit.			Moon's apparent declination at time of her meridian transit. U., upper; L., lower. + north; — south.			Sun's apparent declination at time of moon's meridian transit. + N.; — S.	
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	d.	h.	m.		°	'	°	'
January, 1859.																				
U.—4th, 00h. 33m ..	3.072	2.954	2.911	2.872	3.000	2.982	2.888	2.784	2.748	2.868	2.884	2.810	0	12	58	U.	— 25	18	—22	44
L.—4th, 12 57 ..	3.220	3.206	3.184	3.172	3.146	3.156	3.152	3.126	3.112	3.062	3.034	3.022	1	01	22	L.	— 23	47	22	41
U.—18th, 12 30 ..	2.620	2.610	2.580	2.560	2.560	2.540	2.530	2.510	2.470	2.460	2.430	2.440	15	00	57	U.	+ 21	54	20	26
L.—19th, 01 00 ..	2.780	2.800	2.810	2.820	2.820	2.800	2.760	2.790	2.800	2.800	2.810	2.830	15	13	27	L.	19	16	20	20
U.—19th, 13 28 ..	2.744	2.723	2.694	2.681	2.671	2.644	2.623	2.629	2.604	2.591	2.581	2.597	16	01	55	U.	+ 16	18	—20	13
February, 1859.																				
U.—2d, 00h. 02m ..	3.905	3.865	3.827	3.814	3.837	3.821	3.826	3.799	3.793	3.806	3.777	3.759	29	12	29	U.	— 19	20	—16	48
U.—16th, 12 03 ..	3.084	3.112	3.168	3.210	3.235	3.194	3.174	3.178	3.126	3.106	3.096	3.112	14	03	38	U.	+ 13	25	12	09
U.—17th, 12 56 ..	3.097	3.078	3.107	3.142	3.143	3.135	3.153	3.172	3.202	3.203	3.171	3.136	15	04	30	U.	6	37	11	47
L.—18th, 01 20 ..	3.327	3.260	3.210	3.197	3.223	3.260	3.277	3.260	3.220	3.170	3.143	3.133	15	16	55	L.	+ 3	05	—11	36
March, 1859.																				
U.—5th, 00h. 50m ..	3.040	3.027	3.040	3.033	3.027	3.047	3.060	3.057	3.060	3.073	3.070	3.090	0	23	30	U.	+ 0	33	— 6	02
L.—19th, 00 45 ..	3.050	3.000	2.920	2.830	2.870	2.930	2.980	3.070	3.040	2.990	2.970	2.920	14	23	20	L.	7	08	0	32
U.—19th, 13 09 ..	3.066	3.038	3.030	3.026	2.978	2.982	3.020	3.013	2.976	2.978	3.014	3.024	15	11	50	U.	10	23	0	20
L.—20th, 01 33 ..	3.214	3.236	3.264	3.274	3.244	3.216	3.192	3.156	3.136	3.115	3.088	3.061	16	00	10	L.	+ 13	25	— 0	07
April, 1859.																				
L.—3d, 12h. 35m ..	3.450	3.503	3.550	3.567	3.533	3.540	3.485	3.423	3.400	3.440	3.460	3.397	0	20	08	L.	+ 13	18	+ 5	30
L.—17th, 00 11 ..	4.005	3.985	4.002	3.973	3.923	3.895	3.875	3.892	4.003	3.981	3.931	3.898	14	07	43	L.	— 16	24	10	29
U.—17th, 12 35 ..	3.690	3.660	3.638	3.633	3.640	3.617	3.583	3.580	3.613	3.633	3.630	3.660	14	20	08	U.	18	58	10	40
L.—18th, 01 00 ..	3.580	3.560	3.570	3.540	3.560	3.550	3.530	3.520	3.500	3.530	3.530	3.510	15	08	33	L.	— 21	16	+10	50
May, 1859.																				
L.—2d, 12h. 08m .	4.235	4.209	4.174	4.160	4.160	4.185	4.206	4.204	4.179	4.154	4.135	4.141	0	08	16	L.	+ 21	33	+15	32
U.—3d, 00 36 ..	4.082	4.082	4.108	4.121	4.122	4.126	4.166	4.186	4.168	4.158	4.154	4.126	0	20	41	U.	23	35	15	41
L.—3d, 13 05 ..	4.183	4.180	4.153	4.170	4.147	4.126	4.157	4.160	4.077	4.037	4.060	4.077	1	09	11	L.	+ 25	18	15	50
L.—17th, 00 36 ..	3.932	3.942	3.956	3.892	3.782	3.782	3.821	3.876	3.900	3.892	3.900	3.918	14	21	41	L.	— 26	16	19	20
L.—18th, 01 30 ..	4.325	4.360	4.330	4.300	4.290	4.280	4.290	4.300	4.345	4.390	4.405	4.420	15	22	36	L.	— 27	36	+19	34

June, 1859.														
L.—1st, 12*h*. 55*m* ..	4.183	4.073	4.090	4.115	4.143	4.220	4.253	4.227	4.250	4.263	4.167	3.887	0 23 35	L. + 27 38	+22 08
U.—15th, 12 41 ..	4.439	4.435	4.425	4.472	4.537	4.506	4.512	4.483	4.485	4.409	4.329	4.332	14 23 15	U. — 27 10	23 20
L.—16th, 01 07 ..	4.375	4.361	4.341	4.314	4.279	4.241	4.201	4.189	4.209	4.255	4.330	4.391	15 11 40	L. — 26 25	23 21
U.—30th, 00 13 ..	4.548	4.497	4.351	4.451	4.401	4.329	4.417	4.394	4.451	4.486	4.413	4.373	0 03 25	U. + 26 25	+23 12
Totals............	93.246	92.756	92.433	92.262	92.271	92.194	92.136	91.978	91.867	91.850	91.502	91.064			
Means	3.5863	3.5675	3.5550	3.5485	3.5488	3.5459	3.5436	3.5376	3.5333	3.5326	3.5193	3.5024			
Deduct reading of tide-gauge at mean low water of spring tides............	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801	3.4801			
Mean co ordinates of altitude at spring tides............	0.1062	0.0874	0.0749	0.0684	0.0687	0.0658	0.0635	0.0575	0.0532	0.0525	0.0392	0.0223			

J. D. GRAHAM, *Colonel Corps of Engineers.*

OFFICE GENERAL SUPERINTENDENCE OF LAKE HARBOR WORKS, *October* 21, 1863.

TABLE H 11.

Investigation of the problem of a lunar tide on Lake Michigan, showing the quarter-hourly co-ordinates of altitude of the surface of Lake Michigan, observed during the twenty-seven spring tides given in the text, between January 3 and June 30, 1859.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME PRECEDING THE MOON'S TRANSIT AND READINGS OF TIDE-GAUGE.												
	6*h*. 00*m*.	5*h*. 45*m*.	5*h*. 30*m*.	5*h*. 15*m*.	5*h*. 00*m*.	4*h*. 45*m*.	4*h*. 30*m*.	4*h*. 15*m*.	4*h*. 00*m*.	3*h*. 45*m*.	3*h*. 30*m*.	3*h*. 15*m*.	3*h*. 00*m*.
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.													
U.—4th, 00*h*. 33*m*	3.184	3.152	3.124	3.148	3.180	3.184	3.200	3.211	3.210	3.160	3.122	3.134	3.170
L.—4th, 12 57	2.836	2.780	2.738	2.738	2.732	2.754	2.760	2.784	2.838	2.834	2.846	2.786	2.738
U.—18th, 12 30	2.420	2.450	2.450	2.430	2.420	2.440	2.450	2.410	2.430	2.400	2.440	2.460	2.490
L.—19th, 01 00	2.440	2.460	2.490	2.530	2.580	2.560	2.570	2.590	2.600	2.580	2.630	2.640	2.620
U.—19th, 13 28	2.827	2.839	2.849	2.850	2.859	2.877	2.889	2.907	2.910	2.919	2.937	2.949	2.950
February, 1859.													
U.—2d, 00*h*. 02*m*	3.417	3.397	3.384	3.413	3.432	3.454	3.485	3.523	3.544	3.577	3.690	3.693	3.639
U.—16th, 12 03	2.990	3.035	3.058	3.042	3.020	3.064	3.082	3.084	3.056	3.040	3.046	3.082	3.134
U.—17th, 12 56	3.158	3.113	3.071	3.075	3.095	3.107	3.125	3.108	3.129	3.169	3.202	3.195	3.153
L.—18th, 01 20	3.130	3.137	3.133	3.147	3.163	3.177	3.193	3.183	3.130	3.073	3.060	3.117	3.167
March, 1859.													
U.—5th, 00*h*. 50*m*	3.040	3.030	3.047	3.033	3.023	3.033	3.040	3.047	3.067	3.080	3.090	3.103	3.103
L.—19th, 00 45	3.090	3.090	2.935	2.780	2.885	2.990	3.110	3.230	3.255	3.240	3.315	3.350	3.385
U.—19th, 13 09	2.940	2.935	2.958	2.952	2.916	2.936	2.984	3.018	3.042	3.050	3.062	3.052	3.058
L.—20th, 01 33	3.028	3.016	3.006	3.028	3.024	3.036	3.022	3.046	3.122	3.180	3.216	3.184	3.110
April, 1859.													
L.—3d, 12*h*. 35*m*	3.300	3.390	3.480	3.433	3.370	3.337	3.410	3.477	3.560	3.577	3.480	3.487	3.553
L.—17th, 00 11	3.565	3.589	3.622	3.681	3.744	3.789	3.859	3.865	3.919	3.933	3.952	3.975	4.017
U.—17th, 12 35	3.910	3.873	3.833	3.823	3.813	3.770	3.753	3.750	3.723	3.720	3.740	3.757	3.797
L.—18th, 01 00	3.650	3.680	3.690	3.650	3.630	3.630	3.650	3.690	3.740	3.720	3.770	3.790	3.790
May, 1859.													
L.—2d, 12*h*. 08*m*	4.169	4.166	4.169	4.144	4.130	4.111	4.111	4.136	4.171	4.185	4.196	4.247	4.269
U.—3d, 00 36	4.138	4.134	4.118	4.134	4.148	4.148	4.126	4.116	4.102	4.090	4.098	4.122	4.152

L.—3d, 13 05	4.127	4.120	4.123	4.120	4.113	4.130	4.093	4.093	4.117	4.127	4.163	4.193	4.237
L.—17th, 00 36	3 944	3.988	4 012	4.018	3.988	3.994	4.038	4.058	4.070	4.086	4.098	4.084	4.102
L.—18th, 01 30	4.090	4.120	4.140	4 180	4.130	4.150	4.150	4.190	4.220	4.200	4.250	4.250	4.270
L.—31st, 11 51	4.262	4.266	4.290	4.310	4.336	4.342	4.310	4.294	4.278	4.318	4.376	4.408	4.420
June, 1859.													
L.—1st, 12h. 55m	4.113	4.123	4.260	4.347	4.287	4.203	4.193	4.287	4.383	4.350	4.267	4.260	4.343
U.—15th, 12 41	4.189	4.195	4.307	4.306	4.305	4.325	4.264	4.308	4.359	4.299	4.233	4.132	4.137
L.—16th, 01 07	4.324	4.312	4.313	4.373	4.428	4.343	4.275	4 261	4 221	4.332	4.361	4.298	4.273
U.—30th, 00 13	4.465	4.399	4.390	4.425	4.647	4.576	4.499	4.533	4.497	4.455	4.476	4.404	4.442
Totals	94.746	94.810	94.990	95.110	95.398	95.460	95.641	96 199	96.703	96.734	97.046	97.082	97.519
Means	3.5091	3.5115	3.5181	3.5226	3.5333	3.5355	3.5423	3.5629	3.5816	3.5827	3.5943	3.5956	3.6118
Deduct reading of tide-gauge at mean low water of spring tides	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091
Co-ordinates of altitude at spring tides..	0.0000	0.0024	0.0090	0.0135	0.0242	0.0264	0.0332	0.0538	0.0725	0.0738	0.0852	0.0865	0.1027

TABLE H 11—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME PRECEDING THE MOON'S TRANSIT AND READINGS OF TIDE-GAUGE.											Moon in meridian.
	2h. 45m.	2h. 30m.	2h. 15m.	2h. 00m.	1h. 45m.	1h. 30m.	1h. 15m.	1h. 00m.	0h. 45m.	0h. 30m.	0h. 15m.	0
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.												
U.—4th, 00h. 33m.	3.258	3.284	3.256	3.256	3.316	3.310	3.356	3.374	3.350	3.340	3.288	3.250
L.—4th. 12 57	2.786	2.832	2.864	2.830	2.852	2.876	2.904	2.934	2.940	2.908	2.940	2.940
U.—18th, 12 30	2.500	2.530	2.520	2.550	2.560	2.590	2.610	2.630	2.650	2.680	2.690	2.720
L.—19th, 01 00	2.600	2.630	2.610	2.630	2.640	2.650	2.710	2.780	2.820	2.790	2.840	2.860
U.—19th, 13 28	2.967	2.987	2.999	3.009	2.993	2.981	2.989	2.973	2.970	2.961	2.943	2.930
February, 1859.												
U.—2d, 00h. 02m.	3.633	3.655	3.697	3.741	3.754	3.779	3.771	3.777	3.761	3.773	3.798	3.850
U.—16th, 12 03	3.144	3.130	3.176	3.208	3.232	3.206	3.232	3.250	3.286	3.272	3.284	3.300
U.—17th, 12 56	3.147	3.165	3.214	3.245	3.228	3.290	3.235	3.255	3.297	3.303	3.278	3.290
L.—18th, 01 20	3.183	8.133	3.097	3.093	3.117	3.157	3.183	3.190	3.170	3.227	3.280	3.370
March, 1859.												
U.—5th, 00h. 50m.	3.130	3.137	3.140	3.130	3.167	3.190	3.170	3.163	3.150	3.163	3.190	3.210
L.—19th, 00 45	3.420	3.402	3.385	3.368	3.350	3.225	3.100	3.235	3.370	3.345	3.320	3.300
U.—19th, 13 09	3.082	3.114	3.130	3.112	3.112	3.108	3.088	3.092	3.118	3.148	3.136	3.140
L.—20th, 01 33	3.086	3.162	3.214	3.220	3.174	3.150	3.154	3.174	3.202	3.250	3.254	3.270
April, 1859.												
L.—3d, 12h. 35m.	3.607	3.640	3.627	3.697	3.750	3.737	3.607	3.553	3.577	3.663	3.683	3.710
L.—17th, 00 11	4.008	3.978	3.970	4.007	4.042	4.072	4.073	4.070	4.092	4.093	4.075	4.100
U.—17th, 12 35	3.803	3.803	3.827	3.833	3.853	3.840	3.847	3.870	3.907	3.933	3.913	3.940
L.—18th, 01 00	3.760	3.770	3.780	3.750	3.780	3.770	3.810	3.790	3.800	3.820	3.780	3.740
May, 1859.												
L.—2d, 12h. 08m.	4.265	4.281	4.274	4.276	4 301	4.321	4.298	4.275	4.291	4.305	4 326	4.340
U.—3d, 00 36	4.170	4.186	4.206	4.192	4.192	4.218	4.242	4.248	4.214	4.190	4.182	4.150
L.—3d, 13 05	4.220	4.230	4.300	4.317	4.267	4.247	4.260	4.250	4.237	4.263	4.226	4.310
L.—17th, 00 36	4.124	4.118	4.100	4.092	4.096	4.128	4.140	4.136	4.142	4.136	4.066	3.950
L.—18th, 01 30	4.300	4.330	4.310	4.370	4.370	4.390	4.410	4.430	4.510	4 590	4.615	4.640
L.—31st, 11 51	4.408	4.386	4.400	4.418	4.384	4.352	4.356	4.284	4.386	4.368	4.334	4.330

June, 1859.												
L.—1st, 12*h*. 55*m*.	4.427	4.410	4.370	4.407	4.583	4.713	4.853	4.890	4.907	4.960	4.993	4.930
U.—15th, 12 41	4.319	4.343	4.323	4.276	4.289	4.337	4.379	4.375	4.370	4.407	4.501	4.480
L.—16th, 01 07	4.333	4.375	4.357	4.339	4.415	4.481	4.493	4.511	4.491	4.496	4.531	4.500
U.—30th, 00 13	4.467	4.496	4.613	4.587	4.441	4.342	4.295	4.333	4.279	4.331	4.375	4.450
Totals.....................	98.147	98.507	98.759	98.953	99.278	99.390	99.565	99.942	100.287	100.715	100.899	101.000
Means	3.6351	3.6484	3.6577	3.6649	3.6770	3.6811	3.6876	3.7016	3.7143	3.7302	3.7370	3.7407
Deduct reading of tide-gauge at mean low water of spring tides..............	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091
Co-ordinates of altitude at spring tides...............	0.1260	0.1393	0.1486	0.1558	0.1679	0.1720	0.1785	0.1925	0.2052	0.2211	0.2279	0.2316

TABLE H 11—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.													
	0h. 15m.	0h. 30m.	0h. 45m.	1h. 00m.	1h. 15m.	1h. 30m.	1h. 45m.	2h. 00m.	2h. 15m.	2h. 30m.	2h. 45m.	3h. 00m.	3h. 15m.	3h. 30m.
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.														
U.—4th, 00h. 33m.	3.204	3.264	3.272	3.232	3.204	3.222	3.224	3.190	3.140	3.076	2.962	2.916	3.026	3.060
L.—4th, 12 57	2.998	3.026	3.014	3.074	3.074	3.046	3.072	3.096	3.116	3.128	3.154	3.208	3.212	3.186
U.—18th, 12 30	2.720	2.740	2.760	2.770	2.800	2.810	2.830	2.810	2.780	2.740	2.730	2.700	2.680	2.640
L.—19th, 01 00	2.930	2.980	2.980	2.890	2.950	2.940	2.940	2.910	2.930	2.890	2.870	2.840	2.810	2.800
U.—19th, 13 28	2.903	2.887	2.872	2.857	2.842	2.823	2.811	2.888	2.865	2.843	2.831	2.804	2.791	2.773
February, 1859.														
U.—2d. 00h. 02m.	3.875	3.913	3.927	3.914	3.948	3.963	3.977	3.961	3.969	3.965	4.005	4.032	3.976	3.945
U.—16th, 12 03	3.334	3.298	3.318	3.274	3.280	3.248	3.276	3.252	3.216	3.198	3.182	3.154	3.160	3.112
U.—17th, 12 56	3.309	3.327	3.308	3.285	3.243	3.245	3.228	3.176	3.175	3.187	3.168	3.094	3.033	3.079
L.—18th, 01 20	3.373	3.387	3.393	3.387	3.413	3.480	3.580	3.543	3.447	3.340	3.260	3.247	3.273	3.317
March, 1859.														
U.—5th, 00h. 50m.	3.227	3.213	3.190	3.160	3.140	3.133	3.120	3.107	3.087	3.097	3.083	3.060	3.027	3.017
L.—19th, 01 45	3.360	3.290	3.250	3.120	3.100	3.240	3.220	3.150	3.140	3.100	3.070	3.000	3.030	3.000
U.—19th, 13 09	3.128	3.102	3.084	3.098	3.122	3.112	3.112	3.120	3.102	3.066	3.056	3.072	3.080	3.086
L.—20th, 01 33	3.316	3.308	3.330	3.286	3.280	3.316	3.306	3.318	3.260	3.222	3.224	3.208	3.238	3.226
April, 1859.														
L.—3d, 12h. 35m.	3.757	3.707	3.667	3.700	3.720	3.667	3.623	3.563	3.503	3.510	3.577	3.617	3.520	3.397
L.—17th, 00 11	4.120	4.135	4.147	4.121	4.103	4.100	4.115	4.091	4.093	4.107	4.088	4.051	4.062	4.033
U.—17th, 12 35	3.910	3.877	3.853	3.850	3.830	3.820	3.787	3.753	3.757	3.777	3.733	3.693	3.690	3.707
L.—18th, 01 00	3.710	3.670	3.650	3.640	3.620	3.600	3.650	3.680	3.690	3.670	3.630	3.630	3.600	3.580
May, 1859.														
L.—2d, 12h. 08m.	4.327	4.331	4.321	4.294	4.296	4.299	4.290	4.285	4.253	4.225	4.236	4.239	4.214	4.221
U. 3d, 00 36	4.174	4.206	4.180	4.146	4.132	4.112	4.108	4.116	4.110	3.106	4.096	4.094	4.108	4.108
L.—3d, 13 05	4.287	4.263	4.283	4.310	4.317	4.317	4.247	4.260	4.227	4.250	4.270	4.263	4.233	4.193
L.—17th, 00 36	4.058	4.116	4.176	4.166	4.078	4.062	3.996	3.928	3.848	3.890	3.878	3.952	4.012	4.002
L.—18th, 01 30	4.650	4.660	4.620	4.580	4.555	4.530	4.495	4.460	4.415	4.370	4.370	4.370	4.330	4.290
L.—31st, 11 51	....	....	....	....	....	....	....	....	....	....	....	....	....	....

June, 1859.														
....	4.332	4.308	4.306	4.326	4.300	4.284	4.320	4.304	4.260	4.234	4.252	4.246	4.206	4.212
L.—1st, 12*h.* 55*m.*	4.593	4.753	4.577	4.570	4.603	4.570	4.490	4.400	4.403	4.420	4.447	4.413	4.317	4.217
U.—15th, 12 41	4.537	4.535	4.567	4.624	4.625	4.613	4.647	4.609	4.597	4.556	4.481	4.482	4.512	4.498
L.—16th, 01 07	4.452	4.435	4.445	4.450	4.450	4.445	4.435	4.423	4.408	4.388	4.363	4.359	4.379	4.385
U.—30th, 00 13	4.485	4.646	4.722	4.626	4.558	4.446	4.430	4.560	4.615	4.559	4.576	4.485	4.522	4.591
Totals	101.369	101.377	101.195	100.750	100.578	100.443	100.349	99.953	99.398	98.844	98.612	98.229	98.063	97.705
Means	3.7544	3.7547	3.7480	3.7315	3.7251	3.7201	3.7166	3.7019	3.6814	3.6609	3.6523	3.6381	3.6320	3.6187
Deduct reading of tide-gauge at mean low water of spring tides	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091
Co-ordinates of altitude at spring tides	0.2453	0.2456	0.2389	0.2224	0.2160	0.2110	0.2075	0.1928	0.1723	0.1518	0.1432	0.1290	0.1229	0.1096

TABLE H 11—Continued.

Date and time of moon's meridian transit. U., upper; L., lower.	TIME AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.												Moon's age at time of meridian transit.			Moon's apparent declination at time of her meridian transit. U., upper; L., lower. + north; — south.			Sun's apparent declination at time of moon's meridian transit. + north; — south.	
	3h. 45m.	4h. 00m.	4h. 15m.	4h. 30m.	4h. 45m.	5h. 00m.	5h. 15m.	5h. 30m.	5h. 45m.	6h. 00m.	6h. 15m.	6h. 30m.								
	Feet and decimals.	Feet and decimals	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	d.	h.	m.		°	'	°	'
January, 1859.																				
U.—4th, 00h. 32m...	3.072	2.954	2.911	2.872	3.000	2.982	2.888	2.784	2.748	2.868	2.884	2.810	0	12	58	U. —	25	18	—22	44
L.—4th, 12 57 ...	3.220	3.206	3.184	3.172	3.146	3.156	3.152	3.126	3.112	3.062	3.034	3.022	1	01	22	L. —	23	47	22	41
U.—18th, 12 30 ...	2.620	2.610	2.580	2.560	2.560	2.540	2.530	2.510	2.470	2.460	2.430	2.440	15	00	57	U. +	21	54	20	26
L.—19th, 01 00 ...	2.780	2.800	2.810	2.820	2.820	2.800	2.760	2.790	2.800	2.800	2.810	2.830	15	13	27	L.	19	16	20	20
U.—19th, 13 28 ...	2.744	2.723	2.694	2.681	2.671	2.644	2.623	2.629	2.604	2.591	2.581	2.597	16	01	55	U. +	16	18	20	13
February, 1859.																				
U.—2d, 00h. 02m...	3.905	3.865	3.827	3.814	3.837	3.821	3.826	3.799	3.793	3.806	3.777	3.759	29	12	29	U. —	19	20	16	48
U.—16th, 12 03 ...	3.084	3.112	3.168	3.210	3.235	3.194	3.174	3.178	3.126	3.106	3.096	3.112	14	03	18	U. +	13	25	12	09
U.—17th, 12 54 ...	3.097	3.078	3.107	3.142	3.143	3.155	3.153	3.172	3.202	3.203	3.171	3.136	15	04	10	U.	6	37	11	47
L.—18th, 01 20 ...	3.327	3.260	3.210	3.197	3.223	3.260	3.277	3.260	3.220	3.170	3.143	3.131	15	16	35	L.	3	05	11	36
March, 1859.																				
U.—5th, 00h 50m...	3.040	3.027	3.040	3.033	3.027	3.047	3.060	3.057	3.060	3.073	3.070	3.090	0	23	30	U.	0	33	6	02
L.—19th, 00 45 ...	3.050	3.000	2.920	2.830	2.870	2.930	2.980	3.070	3.040	2.970	2.970	2.920	14	23	20	L.	7	08	0	32
U.—19th, 13 04 ...	3.066	3.038	3.030	3.006	2.978	2.982	3.020	3.013	2.976	2.978	3.014	3.024	15	11	50	U.	10	23	0	20
L.—20th, 01 13 ..	3.214	3.236	3.264	3.274	3.244	3.216	3.192	3.156	3.136	3.115	3.088	3.061	16	00	10	L.	13	25	— 0	07
April, 1859.																				
L.—2d, 12h. 35m...	3.430	3.503	3.550	3.567	3.533	3.540	3.485	3.423	3.400	3.440	3.460	3.397	0	20	08	L.	13	18	+ 5	30
L.—17th, 00 11 ...	4.015	3.985	4.002	3.973	3.993	3.895	3.875	3.892	4.003	3.981	3.931	3.898	14	07	45	L. +	16	24	10	29
U.—17th, 12 35 ...	3.690	3.660	3.638	3.633	3.610	3.617	3.581	3.580	3.613	3.633	3.630	3.660	14	20	08	U. —	18	58	10	40
L.—18th, 01 00 ..	3.580	3.560	3.570	3.540	3.560	3.550	3.550	3.520	3.500	3.530	3.530	3.510	15	08	33	L. —	21	16	10	50
May, 1859.																				
L.—2d, 12h 05m...	4.235	4.200	4.174	4.160	4.160	4.185	4.206	4.204	4.179	4.154	4.135	4.141	0	08	16	L. +	21	33	15	32
U.—3d, 00 36 ...	4.182	4.082	4.108	4.124	4.122	4.126	4.164	4.186	4.16	4.158	4.154	4.124	0	20	4	U.	23	35	15	41
L.—3d, 13 05 ...	4.183	4.180	4.153	4.170	4.147	4.126	4.157	4.160	4.077	4.057	4.060	4.077	1	09	11	L. +	25	18	15	50
L.—17th, 00 36 ...	3.931	3.942	3.956	3.892	3.782	3.782	3.824	3.876	3.900	3.892	3.900	3.918	14	21	41	L. —	26	16	19	20
L.—18th, 01 33 ...	4.325	4.360	4.330	4.300	4.290	4.280	4.290	4.300	4.345	4.390	4.405	4.420	15	21	36	L. —	27	36	19	34
L.—31st, 11 51 ...	....	....	....	....	....	....	....	....	....	....	....	....	29	07	56	L. +	26	39	+22	00

June, 1859.																				
....	4.214	4.186	4.200	4.240	4.228	4.202	4.194	22	4.258	4.266	4.272	4 282								
L.—1st, 12*h*.55*m*...	4.183	4.073	4.090	4.115	4.143	4.220	4.253	4.227	4.250	4.263	4.167	3.887	0	23	35	L. +	27	38	+22	08
U.—15th, 12 41 ...	4.439	4.435	4.425	4.472	4.537	4.506	4.512	4.483	4.485	4.409	4.329	4.332	14	23	15	U. —	27	10	23	20
L.—16th, 01 07 ...	4.375	4.361	4.341	4.314	4.279	4.241	4.201	4.189	4.209	4.255	4.330	4 391	15	11	40	L. —	26	25	23	21
U.—30th, 00 13 ...	4.548	4.497	4.351	4.451	4.401	4.399	4.417	4.394	4.451	4.486	4.403	4.373	0	03	25	U. +	26	25	+23	12
Totals...........	97.460	96.942	96.633	96.502	96 499	96.396	96.328	96.198	96.125	96.116	95.774	95.346								
Means..............	3.6096	3.5904	3.5790	3.5741	3.5740	3.5702	3.5677	3.5629	3.5602	3.5598	3.5472	3.5313								
Deduct reading of tide-gauge at mean low water of spring tides..............	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091	3.5091								
Co-ordinates of altitude at spring tides	0.1005	0.0813	0.0699	0.0650	0.0649	0.0611	0.0586	0.0538	0.0511	0.0507	0.0381	0.0222								

J. D. GRAHAM, *Colonel Corps of Engineers.*

OFFICE UNITED STATES LAKE SURVEY, *Detroit, October* 21, 1863.

TABLE H 13.

Investigation of the problem of a lunar tide on Lake Michigan, showing the half-hourly (and in four places the quarter-hourly) co-ordinates of altitude of the surface of Lake Michigan, derived from seven hundred and fifty-six observations made during twenty-eight neap tides, (observed at the first and third quarters of the moon,) between January 11, and June 24, 1859.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIMES PRECEDING THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.										Moon in meridian.
	5*h*. 00*m*.	4*h*. 30*m*.	4*h*. 00*m*.	3*h*. 30*m*.	3*h*. 00*m*.	2*h*. 30*m*.	2*h*. 00*m*.	1*h*. 30*m*.	1*h*. 00*m*.	0*h*. 30*m*.	0.
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.											
L.—11th, 17*h*. 57*m*.	3.217	3.247	3.259	3.287	3.326	3.366	3.388	8.417	3.411	3.428	3.460
U.—12th, 06 21	2.854	2.842	2.898	3.050	3.090	3.057	2.974	3.013	3.082	3.107	3.050
L.—12th, 18 45	3.030	3.105	3.135	3.155	3.180	3.210	3.235	3.255	3.275	3.310	3.300
L.—25th, 05 54	2.942	2.948	2.988	3.048	3.084	3.114	3.120	3.128	3.146	3.206	3.160
U.—25th, 18 17	2.885	2.891	2.911	2.937	2.956	2.977	2.979	2.993	3.033	3.073	3.130
L.—26th, 06 40	3.200	3.193	3.187	3.203	3.227	3.273	3.306	3.323	3.337	3.357	3.370
February, 1859.											
U.—10th, 05*h*. 58*m*.	3.209	3.257	3.204	3.237	3.296	3.356	3.379	3.380	3.389	3.409	3.430
L.—10th, 18 27	3.317	3.323	3.348	3.323	3.356	3.414	3.456	3.415	3.392	3.426	3.400
U.—11th, 06 56	3.283	3.368	3.415	3.394	3.373	3.379	3.354	3.333	3.365	3.353	3.320
March, 1859.											
U.—11th, 05*h*. 50*m*.	3.393	3.453	3.370	3.393	3.403	3.210	3.000	2.780	2.767	2.840	2.830
L.—11th, 18 21	2.695	2.761	2.745	2.835	2.901	3.008	2.966	2.839	2.863	2.946	2.900
U.—12th, 06 53	2.959	3.011	2.984	3.031	3.111	3.181	3.146	3.168	3.203	3.248	3.230
U.—25th, 18 15	3.390	3.390	3.400	3.420	3.390	3.410	3.390	3.380	3.440	3.360	3.410
April, 1859.											
L.—25th, 06*h*. 55*m*.	3.987	3.990	4.180	4.190	4.213	4.267	4.327	4.300	4.317	4.317	4.390
U.—25th, 19 16	4.333	4.347	4.221	4.240	4.273	4.304	4.343	4.427	4.338	4.281	4.320
L.—26th, 07 37	4.281	4.483	4.693	4.802	4.662	4.555	4.543	4.641	4.604	4.531	4.540
May, 1859.											
U.—9th, 06*h*. 31*m*.	4.469	4.427	4.422	4.451	4.443	**4.533**	4.488	4.452	4.519	4.458	4.480

L.—9th, 18 56	4.136	4.185	4.160	4.203	4.265	4.272	4.278	4.325	4.271	4.248	4.260
U.—10th, 07 21	4.086	3.924	3.974	4.032	4.004	4.108	4.062	4.102	4.182	4.198	4.230
L.—24th, 06 14	3.869	3.653	3.720	3.737	3.816	3.845	3.935	4.139	4.238	4.291	4.140
U.—24th, 18 35	4.217	4.273	4.267	4.220	4.307	4.383	4.377	4.447	4.467	4.363	4.310
L.—25th, 06 55	4.217	4.287	4.243	4.377	4.390	4.490	4.487	4.480	4.517	4.423	4.290
June, 1859.											
U.—9th, 07*h*. 39*m*	4.323	4.327	4.335	4.331	4.231	4.177	4.115	4.108	3.986	3.990	3.850
L.—9th, 20 02	4.415	4.499	4.611	4.493	4.539	4.674	4.727	4.681	4.687	4.647	4.750
U.—10th, 08 25	4.608	4.625	4.747	4.695	4.563	4.565	4.587	4.615	4.528	4.552	4.600
L.—23d, 06 12	4.480	4.390	4.580	4.356	4.338	4.351	4.366	4.396	4.384	4.410	4.470
U.—23d, 18 33	4.442	4.348	4.424	4.438	4.368	4.434	4.446	4.500	4.514	4.622	4.560
L.—24th, 06 55	4.473	4.460	4.470	4.500	4.470	4.413	4.403	4.557	4.587	4.610	4.630
Totals	104.750	105.007	105.691	106.378	106.575	107.332	107.107	107.594	107.862	108.004	107.810
Means	4.7411	3.7502	3.7747	3.7992	3.8062	3.8333	3.8252	3.8426	3.8522	3.8573	3.8504
Reading of tide-gauge at mean low water of neap tides	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411
Mean co-ordinates of altitude at neap tides	0.0000	0.0091	0.0336	0.0581	0.0651	0.0922	0.0841	0.1015	0.1111	0.1162	0.1093

TABLE H 13—Continued.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIMES AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.																Moon's age at time of meridian transit.	Moon's apparent declination at time of her meridian transit. + north; — south.	Sun's apparent declination at time of moon's meridian transit. + N.; — S.
	0h.30m	0h.45m	1h.00m.	1h.15m.	1h. 30m.	2h. 00m.	2h. 30m.	3h. 00m.	3h. 30m.	4h. 00m.	4h. 30m.	5h. 00m.	5h. 30m.	6h. 00m.	6h. 30m.	7h. 00m.			
	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'l .	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.			
January 1859.																	d. h. m.	° ′	° ′
L.—11th, 17h. 57m.	3.496	3.516	3.536	3.444	3.324	3.172	3.106	2.992	2.971	3.024	2.910	2.828	2.810	2.875	2.907	3.183	8 06 24	L. + 13 15	— 21 41
U.—12th, 06 21 .	2.872	2.810	2.865	2.890	2.915	2.941	2.974	3.015	**3.009**	3.035	3.078	3.069	3.053	3.022	2.996	2.915	8 18 48	U. 16 05	21 36
L.—12th, 18 45 .	3.240	3.200	3.220	3.240	3.265	3.315	3.300	3.165	3.090	3.040	3.130	3.250	3.325	3.156	3.210	2.977	9 07 12	L. + 18 44	21 31
L.—25th, 05 54 .	3.052	3.045	3.070	3.074	3.164	2.988	2.954	2.982	2.9 6	2.944	2.916	2.926	2.906	2.868	2.868	2.966	21 18 21	L. — 18 26	18 54
U.—25th, 18 17 .	3.173	3.157	3.137	3.119	3.109	3.100	3.094	3.118	3.174	3.206	3.189	3.197	3.221	3.246	3.212	2.881	22 06 44	U. 20 42	18 46
L.—26th, 06 40 .	3.380	3.365	3.353	3.343	3.330	3.307	3.310	3.307	3.247	3.227	3.247	3.250	3.237	3.253	3.270	3.193	22 19 07	L.— 21 42	18 38
February, 1859.																			
U.—10th, 05h. 58m.	3.449	3.463	3.478	3.497	3.517	3.539	3.400	3.343	3.377	3.352	3.322	3.301	3.337	3.312	3.282	3.203	7 21 12	U + 23 57	14 14
L.—11th, 18 27 .	3.373	3.358	3.343	3.316	3.296	3.253	3.223	3.193	3.154	3.150	3.114	3.092	3.072	3.115	3.147	3.289	8 09 41	L. 25 34	14 05
U.—11th, 06 56 .	3.337	3.351	3.366	3.385	3.405	3.393	3.416	3.385	3.354	3.324	3.294	3.273	3.279	3.254	3.259	3.228	8 22 11	U. 26 56	13 55
March, 1859.																			
U.—11th, 05h. 56m.	2.850	2.858	2.913	2.928	2.863	2.740	2.640	2.663	2.783	2.937	3.063	3.149	2.969	2.873	2.757	3.310	7 04 30	U. 27 53	3 36
L.—11th, 18 21 .	2.768	2.732	2.687	2.670	2.695	2.7 8	2.771	2.654	2.541	**2.464**	2.618	2.774	2.915	3.016	3.082	2.668	7 17 06	L. 28 06	4 24
U.—12th, 05 53 .	3.202	3.201	3.221	3.2 [illegible]	3.238	3.255	3.260	3.245	3.2 7	3.218	3.189	3.142	3.153	3.160	3.129	3.016	8 05 35	U.— 27 48	— 3 12
U.—25th, 18 15 .	3.320	3.290	3.250	3.230	3.240	3.210	3.210	3.270	3.270	3.200	3.160	3.270	3.300	3.450	3.390	3.330	21 16 55	U.— 27 25	+ 2 07
April, 1859.																			
L.—25th, 06h. 55m.	4.300	4.277	4.310	4.363	4.367	4.430	4.470	4.510	4.537	4.567	4.687	4.570	4.580	4.473	4.473	4.033	22 14 28	L. 17 31	13 17
U.—25th, 19 16 .	4.249	4.229	4.209	4.200	4.199	4.151	4.202	4.209	4.169	4.148	4.139	4.095	4.055	4.193	4.194	4.466	23 02 48	U. 15 26	13 27
L.—26th, 07 37 .	4.542	4.519	4.516	4.523	4.578	4.611	4.549	4.513	4.479	4.487	4.505	4.497	4.508	4.456	4.417	4.283	23 15 11	L.— 12 41	13 37
May, 1859.																			
U.—9th, 06h. 37m	4.548	4.519	4.497	4.462	4.489	4.403	4.505	4.339	4.333	4.334	4.349	4.282	4.277	4.289	4.231	4.501	7 02 36	U.+ 14 09	17 25
L.—9th, 18 56 .	4.298	4.305	4.295	4.261	4.235	4.228	4.292	4.211	**4.079**	4.227	4.394	4.498	4.406	4.149	4.100	4.221	7 15 01	L. 10 58	17 33
U.—10th, 07 21 .	4.216	4.236	4.210	4.164	4.152	4.094	4.180	4.210	4.264	4.228	4.164	4.078	4.016	4.012	3.946	4.178	8 03 26	U.+ 7 54	17 42
L.—24th, 06 14 .	3.985	4.149	4.132	4.158	4.216	4.193	4.131	4.123	**4.031**	**4.003**	4.137	4.101	4.157	4.190	4.167	3.921	22 02 21	L.— 9 19	20 49
U.—24th, 18 35 .	4.533	4.630	4.520	4.487	4.460	4.413	4.400	4.517	4.483	4.397	4.437	4.320	4.197	4.350	4.303	4.187	22 14 41	U. 6 32	20 54
L.—25th, 06 55 .	4.280	4.330	4.363	4.350	4.300	4.147	4.113	4.103	4.197	4.243	4.320	4.287	4.260	4.300	4.293	4.137	23 03 01	L. 3 40	21 00

June, 1859.																			
U.—9th, 07*h*. 39*m*.	4.502	4.572	4.537	4.432	4.366	4.316	4.321	4.282	4.255	4.272	4.245	4.292	4.338	4.324	4.404	4.306	8 18 20	U. 9 44	22 58
L.—9th, 20 02 .	4.783	4.808	4.835	4.875	4.917	5.011	4.888	4.989	4.805	4.459	4.595	4.664	4.577	4.539	4.657	4.457	9 06 40	L. 12 39	23 00
U.—10th, 08 25 .	4.478	4.480	4.495	4.500	4.500	4.467	4.402	4.415	4.462	4.462	4.393	4.363	4.392	4.392	4.423	4.627	9 19 05	U.— 15 25	23 03
L.—23d, 06 12 .	4.546	4.502	4.458	4.482	4.530	4.584	4.530	4.444	4.476	4.438	4.368	4.390	4.336	4.342	4.298	4.482	22 16 45	L.+ 5 54	23 27
U.—23d, 18 33 .	4.536	4.530	4.578	4.606	4.590	4.552	4.554	4.596	4.596	4.546	4.478	4.470	4.528	4.414	4.370	4.360	23 05 10	U. 8 50	23 26
L.—24th, 06 55 .	4.540	4.547	4.547	4.560	4.517	4.547	4.467	4.473	4.503	4.400	4.447	4.363	4.405	4.405	4.450	4.580	23 17 30	L.+ 11 41	+ 23 26
Totals........	107.848	108.009	107.941	107.792	107.667	107.089	106.662	106.266	105.825	105.332	105.888	105.791	105.600	105.458	105.135	104.934			
Means...........	3.8517	3.8575	3.8550	3.8497	3.8452	3.8246	3.8094	3.7952	3.7795	3.7619	3.7817	3.7782	3.7714	3.7628	3.7548	3.7476			
Reading of tide-gauge at mean low water of neap tides......	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411			
Mean co-ordinates of altitude at neap tides......	0.1106	0.1164	0.1139	0.1086	0.1041	0.0835	0.0683	0.0541	0.0384	0.0208	0.0406	0.0371	0.0303	0.0217	0.0137	0.0065			

J. D. GRAHAM, *Colonel Corps of Engineers*,

OFFICE UNITED STATES LAKE SURVEY, *Detroit, October* 21, 1863.

TABLE H 14.

Investigation of the problem of a lunar tide on Lake Michigan, showing the half-hourly (and in four places the quarter-hourly) co-ordinates of altitude of the surface of Lake Michigan, derived from 749 *observations* (7 *out of the* 756 *being rejected) made during twenty-eight neap tides (observed at the first and third quarters of the moon) between January* 11 *and June* 24, 1859.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIMES PRECEDING THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.										Moon in the meridian.
	5h. 00m.	4h. 30m.	4h. 00m.	3h. 30m.	3h. 00m.	2h. 30m.	2h. 00m.	1h. 30m.	1h. 00m.	0h. 30m.	0
	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.	Feet and decimals.
January, 1859.											
L.—11th, 17h. 57m.	3.217	3.247	3.259	3.287	3.326	3.366	3.388	3.417	3.411	3.428	3.460
U.—12th, 06 21	2.854	2.842	2.898	3.050	3.090	3.057	2.974	3.013	3.082	3.107	3.050
L.—12th, 18 45	3.030	3.105	3.135	3.155	3.180	3.210	3.235	3.255	3.275	3.310	3.300
L.—25th, 05 54	2.982	2.948	2.968	3.048	3.084	3.114	3.120	3.128	3.146	3.206	3.160
U.—25th, 18 17	2.885	2.891	2.911	2.937	2.956	2.977	2.979	2.993	3.033	3.073	3.130
L.—26th, 06 40	3.200	3.193	3.187	3.203	3.227	3.273	3.306	3.323	3.337	3.357	3.370
February, 1859.											
U.—10th, 05h. 58m.	3.209	3.257	3.204	3.237	3.296	3.356	3.379	3.380	3.389	3.409	3.430
L.—10th, 18 27	3.317	3.323	3.348	3.323	3.356	3.414	3.456	3.415	3.392	3.426	3.400
U.—11th, 06 56	3.283	3.368	3.415	3.394	3.373	3.379	3.354	3.333	3.365	3.353	3.320
March, 1859.											
U.—11th, 05h. 50m.	3.393	3.453	3.370	3.393	3.403	3.210	3.000	2.780	2.767	2.840	2.830
L.—11th, 18 21	2.695	3.761	2.745	2.835	2.901	3.008	2.966	2.839	2.863	2.946	2.900
U.—12th, 06 53	2.959	3.011	2.984	3.031	3.111	3.184	3.146	3.168	3.203	3.248	3.230
U.—25th, 18 15	3.390	3.390	3.400	3.420	3.390	3.410	3.320	3.380	3.440	3.360	3.410
April, 1859.											
L.—25th, 06h. 55m.	3.987	4.990	4.180	4.190	4.213	4.267	4.327	4.300	4.317	4.317	4.390
U.—25th, 19 16	4.333	4.347	4.221	4.240	4.273	4.304	4.343	4.427	4.338	4.281	4.320
L.—26th, 07 37	4.281	4.483	4.693	4.802	4.662	4.555	4.543	4.641	4.604	4.531	4.540
May, 1859.											
U.—9th, 06h. 31m.	4.469	4.427	4.422	4.451	4.443	....	4.488	4.452	4.519	4.458	4.480

L.—9th, 18 56	4.136	4.185	4.160	4.203	4.265	4.272	4.278	4.325	4.271	4.248	4.260
U.—10th, 07 21	4.086	3.924	3.974	4.032	4.004	4.108	4.062	4.102	4.182	4.198	4.230
L.—24th, 06 14	3.869	3.653	3.720	3.737	3.816	3.845	3.935	4.139	4.258	4.291	4.140
U.—24th, 18 35	4.217	4.273	4.267	4.220	4.307	4.383	4.377	4.447	4.467	4.363	4.310
L.—25th, 06 55	4.217	4.287	4.243	4.377	4.390	4.490	4.487	4.480	4.517	4.423	4.290
June, 1859.											
U.—9th, 07h. 39m.	4.323	4.327	4.335	4.331	4.231	4.177	4.115	4.108	3.986	3.990	3.850
L.—9th, 20 02	4.415	4.499	4.611	4.493	4.539	4.674	4.727	4.681	4.687	4.647	4.750
U.—10th, 08 25	4.608	4.625	4.747	4.695	4.563	4.565	4.587	4.615	4.528	4.552	4.600
L.—23d, 06 12	4.480	4.390	4.380	4.356	4.338	4.354	4.366	4.396	4.384	4.410	4.470
U.—23d, 18 33	4.442	4.348	4.424	4.438	4.368	4.431	4.446	4.500	4.514	4.622	4.560
L.—24th, 06 55	4.473	4.460	4.470	4.500	4.470	4.413	4.463	4.557	4.587	4.610	4.630
Totals	104.750	105.007	105.691	106.378	106.575	102.799	107.107	107.594	107.862	108.004	107.810
Means	3.7411	3.7502	3.7747	3.7992	3.8062	3.8075	3.8252	3.8426	3.8522	3.8573	3.8504
Reading of tide gauge at mean low water of neap tides	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7111	3.7411	3.7411
Mean co-ordinates of altitude at neap tides.	0.0000	0.0091	0.0336	0.0581	0.0651	0.0662	0.0841	0.1015	0.1111	0.1162	0.1093

TABLE H 14—Continued.

Date and time of moon's meridian transit. U., upper; L., lower. Astronomical account.	TIMES AFTER THE MOON'S MERIDIAN TRANSIT AND READINGS OF TIDE-GAUGE.																Moon's age at the time of meridian transit.	Moon's apparent declination at the time of her meridian transit. + north; — south.	Sun's apparent declination at the time of the moon's meridian transit. + N.; — S.
	0h. 30m	0h. 45m.	1h. 00m	1h. 15m.	1h. 30m.	2h. 00m.	2h. 30m.	3h. 00m	3h. 30m	4h. 00m	4h. 30m	5h. 00m	5h. 30m.	6h. 00m.	6h. 30m.	7h. 00m			
	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.	Ft. and deci'ls.			
January, 1859.																	d. h. m.	° ′	° ′
L.—11th, 17h. 57m.	3.496	3.516	3.536	3.444	3.324	3.172	3.106	2.992	2.971	3.024	2.910	2.828	2.810	2.875	2.907	3.183	8 06 24	L. + 13 15	— 21 41
U.—12th, 06 21 .	2.872	2.840	2.865	2.890	2.915	2.944	2.974	3.015	....	3.035	3.078	3.069	3.053	3.022	2.996	2.945	8 18 48	U. 16 03	21 36
L.—12th, 18 45 .	3.240	3.200	3.220	3.240	3.265	3.305	3.300	3.165	3.090	3.040	3.130	3.250	3.325	3.196	3.210	2.973	9 07 12	L. + 18 44	21 31
L.—25th, 05 54 .	3.052	3.045	3.070	3.074	3.064	2.988	2.954	2.982	2.966	2.944	2.916	2.926	2.906	2.868	2.868	2.986	21 18 21	L. — 18 26	18 54
U.—25th, 18 17 .	3.173	3.157	3.137	3.119	3.109	3.100	3.094	3.118	3.174	3.206	3.189	3.197	3.221	3.236	3.212	2.881	22 06 44	U. 20 42	18 46
L.—26th, 06 40 .	3.380	3.365	3.353	3.343	3.330	3.307	3.310	3.307	3.247	3.227	3.247	3.250	3.237	3.253	3.270	3.193	22 19 07	L. — 22 42	18 38
February, 1859.																			
U.—10th, 05h. 58m.	3.449	3.463	3.478	3.497	3.517	3.539	3.400	3.343	3.377	3.352	3.322	3.301	3.337	3.312	3.282	3.203	7 21 12	U. + 23 57	14 14
L.—10th, 18 27 .	3.373	3.358	3.343	3.316	3.286	3.253	3.223	3.193	3.154	3.150	3.114	3.092	3.072	3.115	3.147	3.289	8 09 41	L. 25 34	14 05
U.—11th, 06 56 .	3.337	3.351	3.366	3.385	3.405	3.393	3.416	3.385	3.354	3.324	3.294	3.273	3.279	3.254	3.259	3.228	8 22 11	U. 26 56	13 55
March, 1859.																			
U.—11th, 05h. 50m.	2.850	2.858	2.913	2.928	2.863	2.740	2.640	2.663	2.783	2.937	3.063	3.149	2.960	2.873	2.757	3.310	7 04 30	U. 27 53	3 36
L.—11th, 18 21 .	2.768	2.732	2.687	2.670	2.695	2.738	2.771	2.654	2.544	....	2.618	2.774	2.915	3.016	3.082	2.668	7 17 00	L. 28 06	3 24
U.—12th, 06 53 .	3.202	3.201	3.221	3.233	3.238	3.255	3.260	3.245	3.217	3.218	3.189	3.142	3.153	3.160	3.129	3.016	8 05 35	U. + 27 48	— 3 12
U.—25th, 18 15 .	3.320	3.290	3.250	3.230	3.240	3.210	3.210	3.270	3.270	3.200	3.160	3.270	3.300	3.450	3.390	3.320	21 16 55	U. — 27 25	+ 2 07
April, 1859.																			
L.—25th, 06h. 55m.	4.300	4.277	4.310	4.363	4.367	4.430	4.470	4.510	4.537	4.567	4.687	4.570	4.580	4.473	4.473	4.033	22 14 28	L. 17 31	13 17
U.—25th, 19 16 .	4.249	4.229	4.209	4.200	4.199	4.151	4.202	4.209	4.169	4.148	4.139	4.095	4.055	4.193	4.194	4.466	23 02 48	U. 15 26	13 27
L.—26th, 07 37 .	4.542	4.519	4.516	4.523	4.578	4.611	4.549	4.513	4.479	4.487	4.505	4.497	4.508	4.456	4.417	4.283	23 15 11	L. — 12 41	13 37
May, 1859.																			
U.—9th, 06h. 31m.	4.548	4.519	4.497	4.462	4.489	4.403	4.505	4.339	4.333	4.334	4.349	4.282	4.277	4.289	4.231	4.501	7 02 36	U. + 14 09	17 25
L.—9th, 18 56 .	4.298	4.305	4.295	4.261	4.235	4.228	4.292	4.211	....	4.227	4.394	4.498	4.406	4.149	4.100	4.221	7 15 01	L. 10 58	17 33
U.—10th, 07 21 .	4.216	4.236	4.210	4.164	4.152	4.092	4.180	4.210	4.264	4.228	4.164	4.078	4.016	4.012	3.946	4.178	8 03 26	U. + 7 54	17 42
L.—24th, 06 14 .	3.985	4.149	4.132	4.158	4.216	4.193	4.131	4.123	....	....	4.137	4.101	4.157	4.190	4.167	3.921	22 02 21	L. — 9 19	20 49
U.—24th, 18 35 .	4.533	4.630	4.520	4.487	4.460	4.413	4.400	4.517	4.483	4.397	4.437	4.320	4.197	4.350	4.303	4.187	22 14 41	U. 6 32	20 54
L.—25th, 06 55 .	4.280	4.330	4.363	4.350	4.300	4.147	4.113	4.103	4.197	4.243	4.320	4.287	4.260	4.300	4.293	4.137	23 03 01	L. 3 40	21 00

June, 1859.																			
U.—9th, 07*h.* 38*m.*	4.502	4.572	4.537	4.432	4.366	4.316	4.321	4.282	4.255	....	4.245	4.292	4.338	4.324	4.404	4.306	8 18 20 U.	9 44	23 59
L.—9th, 20 02	4.783	4.808	4.835	4.875	4.917	5.011	4.888	4.989	4.805	4.459	4.795	4.664	4.577	4.539	4.657	4.457	9 06 40 L.	12 39	23 05
U.—11th, 08 25	4.478	4.481	4.495	4.509	4.500	4.467	4.402	4.415	4.462	4.462	4.393	4.363	4.392	4.392	4.424	4.637	9 19 05 U.	15 2	23 03
L.—23d, 06 12	4.546	4.502	4.458	4.482	4.530	4.584	4.570	4.441	4.476	4.418	4.378	4.390	4.316	4.312	4.298	4.482	23 16 45 L.	+ 5 54	23 27
U.—23d, 18 33	4.536	4.530	4.578	4.606	4.590	4.552	4.554	4.596	4.596	4.516	4.478	4.470	4.528	4.414	4.370	4.360	23 05 16 U.	8 50	23 28
L.—24th, 06 55	4.510	4.547	4.547	4.560	4.517	4.547	4.467	4.473	4.503	4.400	4.417	4.363	4.405	4.405	4.350	4.580	23 17 30 L.	11 41	23 26
Totals	107.848	108.009	107.941	107.792	107.667	107.089	106.662	106.266	94.706	94.593	105.888	105.791	105.600	105.458	105.135	104.934			
Means	3.8517	3.8575	3.8550	3.8497	3.8152	3.8246	3.8094	3.7952	3.7882	3.7837	3.7817	3.7782	3.7714	3.7628	3.7548	3.7470			
Reading of tide-gauge at mean low water of neap tides.......	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411	3.7411			
Mean co ordinates of altitude at neap tides......	0.1106	0.1164	0.1139	0.1086	0.1041	0.0835	0.0682	0.0541	0.0471	0.0426	0.0406	0.0371	0.0303	0.0217	0.0137	0.0065			

J. D. GRAHAM, *Colonel Corps of Engineers.*

OFFICE UNITED STATES LAKE SURVEY, *Detroit, October* 21, 1863.

I.

Report of Assistant J. M. Bigelow to Colonel Graham, Superintendent of the Survey of the Northern and Northwestern Lakes.

OFFICE SURVEY NORTHERN AND NORTHWESTERN LAKES,
Detroit, Michigan, October 1, 1863.

SIR : I have the honor to present the following report upon the winds in connexion with the rise and fall of the barometer at Sackett's Harbor, Thunder bay, and Superior City, and upon the mean diurnal variations of atmospheric pressure, temperature, elastic force of vapor, relative humidity, cloudiness, and direction and force of winds from 2,328 hourly observations made at Thunder bay in 1860 and 1861.

RELATION OF WINDS AND CLOUDS TO THE VARIOUS STATES OF BAROMETRIC PRESSURE AT SACKETT'S HARBOR, THUNDER BAY, AND SUPERIOR CITY.

The following tables were constructed from the diagrams exhibiting the rise and fall of the barometer, reduced to the temperature of 32° Fahrenheit, the direction and force of the winds, estimating the extreme limits of force from 1 to 10, the amount of cloudiness and clearness in tenths, and the fall of rain and snow, during a series of three years, from the 1st of June, 1860, to the 30th of June, 1863, inclusive, at Sackett's Harbor, Thunder bay, and Superior City. The observations were taken at 7 a. m., 2 p m , and 9 p. m.

The direction and force of the wind, with the amount of cloudiness and clearness, at each observation, are tabulated each under its appropriate head in table No .1, when the atmospheric pressure was above the mean of the monthly means of the month for the three stations named, and also when the barometer was rising or showing an increase of atmosphere pressure. As a mark of specific distinction, it is called Rising High Barometer. In table No. 2 the winds and clouds are tabulated in the same manner, when the pressure of the atmosphere is still high, but the barometer, having passed its culmination, is falling, evidencing a decrease of atmospheric pressure To distinguish it from the preceding table, it is called Falling High Barometer. The quantities in table No. 7 are the sums of those in tables Nos 1 and 2. The table No. 7 is denominated High Barometer. It denotes the direction and prevalence of the winds and the face of the sky, when the atmospheric pressure is above the mean of the monthly means of the current month for the three stations. In like manner the winds and face of the sky are tabulated in No. 3 when the atmospheric pressure is near the mean of those monthly means, but indicating, by the rising of the barometer, an increase of atmospheric pressure. This table No. 3 is named Rising Mean Barometer. In No. 4 they are tabulated when the barometer is also near the mean of the monthly means for the three stations, but some time afterwards, when the barometer is falling, showing a decrease of atmospheric pressure. The quantities in table No. 11 are sums of those in tables Nos. 3 and 4. No 11 is denominated Mean Barometer, and exhibits the prevalence of winds and clouds during the state of mean atmospheric pressure, while it is both on the increase and decrease. Table No. 5 exhibits the winds and clouds when the atmospheric pressure is low, or below the mean of the monthly means, and when, at the same time, the barometer is rising, showing an increase of atmospheric pressure. This table, No. 5, is called Rising Low Barometer. The winds and clouds are shown in table No. 6, when the barometer is low and still falling, and is denominated Falling Low Barometer, evidencing a low and diminishing pressure of the atmosphere. The quantities in table No. 8 are the sums of those in tables Nos. 5 and 6, and indicate the position of those elements during a diminished atmospheric pressure, and is headed Low Barometer. The quantities in table No. 9 are the sums of those in tables Nos. 1, 3 and 5, giving the prevalence of the winds and clouds, when the pressure of the atmosphere is increasing, or when the barometer is rising, and whether its indications be above or below the mean, and is called Rising Barometer. Table No. 10 exhibits similar results after the barometer has culminated, and shows the prevalence of the winds and clouds when the pressure of the atmosphere is decreasing, and is called Falling Barometer. It is made by the addition of the quantities in tables Nos. 2, 4 and 6.

By reference to the foregoing tables, and by means of the accompanying cards of wind roses, constructed from the totals of the tables, being the aggregate results of three years of observations at each of the places named, the prevailing direction and force of the winds are graphically as well as numerically indicated. The principal points condensed exhibit the following facts:

1st. Under a high atmospheric pressure with an increasing weight of atmosphere, northeastern, southern, western and northern winds, named in the order of their greatest force, prevail at Sackett's Harbor. Northern, northwestern, eastern and northeastern, named in the same order, prevail at Thunder bay. And northeastern, northwestern, southwestern and eastern prevail at Superior City. 2d. Under a low atmospheric pressure, with an increasing weight of atmosphere exhibited by the rising of the barometer, the prevailing winds at Sackett's Harbor are western, southwestern, northwestern and northeastern. At Thunder bay they are northwestern, northern, western and southern; and at Superior City, northwestern, southwestern, western and northeastern.

3d. When the atmospheric pressure is increasing, including high, low and mean states of the actual pressure, the prevailing winds at Sackett's Harbor are western, northeastern, southwestern and northwestern; at Thunder bay, northern, northwestern, western and eastern; and at Superior City, northwestern, northeastern, southwestern and western. 4th. Under a high atmospheric pressure, including both the rising and falling state of the barometer, the prevailing winds at Sackett's Harbor are northeastern, southern, southwestern and western. At Thunder bay, northern, southern, southeastern and norhwestern winds prevail; while at Superior City, northeastern, southwestern, eastern and northwestern are the most prevalent. 5th. When there is high atmospheric pressure, but diminishing in force, as evinced by the falling of the barometer, the prevailing winds at Sackett's Harbor are southern, northeastern, southwestern and western. At Thunder bay, southern, southeastern, eastern and southwestern winds prevail. At Superior City, northeastern, eastern, southwestern and northwestern winds prevail. 6th. Under a low atmospheric pressure, with a diminishing force shown by the falling of the barometer, the prevailing winds at Sackett's Harbor are southern, northeastern, southwestern and western. At Thunder bay they are southern, southeastern, southwestern and western; and at Superior City, southwestern, northeastern, northwestern and eastern. 7th. In a state of atmospheric pressure, including high and low, but constantly tending to diminution, shown by the falling of the barometer, at Sackett's Harbor southern, northwestern and western winds prevail; at Thunder bay, southern, southeastern, eastern and southwestern; and at Superior City, northeastern, southwestern, eastern and northwestern winds prevail. 8th. With low atmospheric pressure, including the rising and falling of the barometer, the prevailing winds at Sackett's Harbor are southern, western, southwestern, and northeastern; at Thunder bay, southern, northwestern, northern and western; while at Superior City, they are southwestern, northwestern, northeastern and western. At Sackett's Harbor, the rising and high barometers are found to occur most frequently during northeastern winds, while the low but rising barometers occur most frequently during western winds. The low and falling barometers are invariably attended with a prevalence of southern winds. At Thunder bay, northern winds prevail with high pressure and rising barometer, but with a low pressure and increasing force northwestern winds are the most prevalent, while with low pressure and a falling barometer, as at Sackett's Harbor, southern winds are greatly predominant. The order of the winds on the cards at Superior City is somewhat different from those of Sackett's Harbor and Thunder bay. Here, with a high pressure and rising barometer, the winds alternate between the northeast and the northwest, while, with a low pressure and falling barometer, the greatest force of the wind is from southwest.

The following is the relative proportion of the winds of each of the eight points, at the three places, without taking into consideration the state of the barometer:

At Sackett's Harbor, 1st, south, 2406; 2d, northeast, 2109; 3d, southwest, 1679; 4th, west, 1573; 5th, northwest, 786; 6th, north, 603; 7th, southeast, 229; and 8th, east, 212. Here the predominant winds are from the south, northeast, and southwest. At Thunder bay they are divided in the following order and proportions: 1st, south, 2161; 2d, north, 1857; 3d, northwest, 1762; 4th, southeast, 1193; 5th, west, 828; 6th, southwest, 582; 7th, northeast, 557; and 8th, east, 314. The most predominant winds here are from the south, north, and northwest. At Superior City they are thus distributed: 1st, northeast, 1185; 2d, southwest, 981; 3d, northwest, 861; 4th, east, 651; 5th, west, 489; 6th, north, 333; 7th, south, 205, and southeast, 183. The greatest winds at Superior City are northeast, southwest, and northwest, while the least are from the southeast, south, and north.

The relative clearness and cloudiness of the sky are also noted and tabulated in all the foregoing conditions of atmospheric pressure. Under a high atmospheric pressure the proportion of clearness to cloudiness, the aggregate of three years' observations was, clearness 7084, cloudiness 5143, at Sackett's Harbor. At Thunder bay, clearness 6315, cloudiness 6613. At Superior City the clearness is 7880, and cloudiness 5156. On the other hand, with a low pressure, at Sackett's Harbor, clearness is 2466, to cloudiness 8320. At Thunder bay, clearness 2558, cloudiness 8743; and at Superior City, clearness 3465, to cloudiness 7540. These figures show, conclusively, that cloudy weather greatly prevails during the existence of a low atmospheric pressure, and that clear weather decidedly prevails during high atmospheric pressure at all the places except Thunder bay, where the amount of clearness and cloudiness is nearly equally divided.

It must be observed that the general amount of cloudiness at Thunder bay greatly exceeds that at the other two places. This will be rendered very manifest by reference to the large diagrams.

The proportion during a rising barometer is as follows, viz: At Sackett's Harbor, clearness 6524, cloudiness 8250; at Thunder bay, clearness 6556, cloudiness 9855; and at Superior City, clearness 7462, and cloudiness is 7888. During the falling of the barometer at Sackett's Harbor, 6459 represents clearness, and 10299 represents cloudiness; at Thunder bay, clearness is 4828, to 11591 for cloudiness; and at Superior City, 7315 clearness, to 9914 cloudiness. Here it is shown again by the numbers that the relationship of cloudiness to a falling barometer is clearly and well marked.

Tables of direction and prevalence of the winds and amount of clearness and cloudiness during the various stages of barometric pressure, being an aggregate of three years at Sackett's Harbor, New York, Thunder bay, Michigan, and Superior City, Wisconsin, from observations taken under the superintendence of Captain G. G. Meade, T. E., from June 1, 1860, *to August* 31, 1861; *and under Colonel J. D. Graham, corps of engineers, from August* 1, 1861, *to June* 30, 1863, *inclusive.*

TABLE 1.—RISING HIGH BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor..	40	125	18	10	78	50	46	13	11	439	921
	Thunder Bay.....	163	30	39	47	20	6	14	66	20	408	1046
	Superior City	13	82	46	1	3	26	16	18	2	492	938
Sept'r, Oct'r, Nov'r.	Sackett's Harbor..	36	109	16	19	53	15	60	39	7	606	719
	Thunder Bay.....	187	47	43	37	50	7	22	119	14	882	686
	Superior City	35	62	36	5	3	38	19	81	3	686	795
Dec'r, Jan'y, Feb'y.	Sackett's Harbor..	50	102	20	4	52	29	46	64	24	751	856
	Thunder Bay.....	131	32	27	16	47	21	73	139	20	1240	568
	Superior City	9	18	10	9	4	78	25	46	0	557	933
Mar., April, May.	Sackett's Harbor..	46	123	6	7	50	61	42	17	31	576	1136
	Thunder Bay	144	51	92	24	30	5	10	110	24	717	1276
	Superior City	19	120	42	9	5	15	21	55	0	660	1039
Tolal for 3 years.	Sackett's Harbor..	172	459	61	40	233	155	194	133	73	2372	3632
	Thunder Bay	625	160	201	124	147	39	119	434	78	3247	3576
	Superior City	76	282	134	24	15	157	81	200	5	2395	3705

TABLE 2.—FALLING HIGH BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor .	3	37	13	5	80	117	78	4	17	438	885
	Thunder Bay.....	40	14	17	95	128	23	1	6	18	501	789
	Superior City	13	82	42	12	6	21	9	13	1	469	915
Sept'r, Oct'r, Nov'r.	Sackett's Harbor .	18	108	14	37	124	38	21	16	8	749	833
	Thunder Bay.....	19	9	53	130	145	31	12	30	4	833	514
	Superior City	7	95	44	6	17	54	8	12	1	750	730
Dec'r, Jan'y, Feb'y.	Sackett's Harbor..	11	82	29	11	157	30	14	4	20	985	664
	Thunder Bay.....	16	18	41	122	175	67	32	3	7	1130	330
	Superior City	7	19	35	15	6	65	14	26	0	651	709
Mar., April, May.	Sackett's Harbor..	1	131	14	5	90	48	24	10	28	589	1030
	Thunder Bay	20	19	90	116	101	11	10	25	19	892	1106
	Superior City	18	131	49	26	3	26	13	25	0	891	1421
Total for 3 years.	Sackett's Harbor .	33	358	70	58	451	233	137	34	73	2761	3412
	Thunder Bay	95	57	201	463	549	132	55	64	48	3356	2739
	Superior City	45	237	170	59	32	166	44	76	2	2761	3775

Table of direction and prevalence of the winds, &c.—Continued.

TABLE 3.—RISING MEAN BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor	38	108	5	2	62	35	34	27	7	498	721
	Thunder Bay	162	18	34	16	13	10	19	34	14	589	641
	Superior City	15	47	21	2	0	15	21	31	7	562	776
Sept'r, Oct'r, Nov'r.	Sackett's Harbor	37	87	3	4	24	46	86	70	3	576	344
	Thunder Bay	82	21	12	0	13	11	38	102	4	662	358
	Superior City	25	17	6	3	2	25	20	59	1	532	437
Dec'r, Jan'y, Feb'y.	Sackett's Harbor	22	55	1	1	7	16	43	64	5	580	275
	Thunder Bay	91	19	10	6	11	19	30	152	4	818	163
	Superior City	5	10	9	4	6	61	25	29	0	571	489
Mar., April, May.	Sackett's Harbor	27	90	0	3	19	82	81	32	8	548	492
	Thunder Bay	111	46	51	11	18	0	14	121	11	608	342
	Superior City	16	47	14	0	2	10	12	47	0	581	338
Total for 3 years.	Sackett's Harbor	124	340	9	10	112	179	244	193	23	2202	1832
	Thunder Bay	446	104	107	33	55	40	101	409	33	2677	1504
	Superior City	61	121	50	9	10	111	78	166	8	2246	2020

TABLE 4.—FALLING MEAN BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor	4	20	3	9	97	98	23	13	13	545	738
	Thunder Bay	12	3	21	65	115	35	27	7	11	712	416
	Superior City	10	72	29	8	10	21	16	14	5	712	777
Sept'r, Oct'r, Nov'r.	Sackett's Harbor	4	91	11	11	130	37	26	29	4	794	276
	Thunder Bay	19	10	25	42	133	14	37	10	3	909	217
	Superior City	13	32	31	5	15	24	21	10	0	631	391
Dec'r, Jan'y, Feb'y.	Sackett's Harbor	0	82	7	7	123	13	9	0	8	827	175
	Thunder Bay	17	24	28	29	158	23	45	9	2	1038	122
	Superior City	15	33	28	8	16	55	14	12	0	898	302
Mar., April, May.	Sackett's Harbor	5	121	9	28	78	74	34	6	17	688	502
	Thunder Bay	25	17	76	82	83	9	24	8	16	764	252
	Superior City	12	59	25	8	13	17	4	17	0	628	362
Total for 3 years.	Sackett's Harbor	13	314	30	55	428	222	92	48	42	2854	1711
	Thunder Bay	73	54	150	218	489	81	133	34	32	3423	1007
	Superior City	50	196	113	29	54	117	55	63	5	2869	1832

Table of direction and prevalence of the winds, &c.—Continued.

TABLE 5.—RISING LOW BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor .	77	69	7	3	34	99	94	20	4	588	442
	Thunder Bay	209	31	58	8	18	11	14	177	13	795	756
	Superior City	19	33	13	1	2	34	54	25	4	631	513
Sept'r, Oct'r, Nov'r.	Sackett's Harbor .	48	46	4	5	60	68	260	124	3	1079	306
	Thunder Bay	93	23	13	7	39	31	97	176	6	1241	305
	Superior City	17	29	8	15	9	69	42	92	1	1032	508
Dec'r, Jan'y, Feb'y.	Sackett's Harbor .	34	42	4	3	12	104	206	128	7	1093	153
	Thunder Bay.....	115	28	1	2	23	22	61	226	5	1082	148
	Superior City	6	20	23	8	5	65	29	69	0	907	403
Mar., April, May.	Sackett's Harbor .	37	40	0	0	21	189	127	35	5	876	227
	Thunder Bay	92	4	18	9	28	17	54	124	8	813	267
	Superior City	3	31	11	1	4	24	25	41	0	677	333
Total for 3 years.	Sackett's Harbor .	196	197	15	11	127	460	687	307	19	3636	1130
	Thunder Bay	509	86	90	26	108	81	226	703	32	3931	1476
	Superior City	45	113	55	25	20	192	150	227	5	3247	1757

TABLE 6.—FALLING LOW BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor	10	59	4	7	255	191	77	3	6	1049	589
	Thunder Bay	31	16	25	92	193	66	35	40	15	1108	462
	Superior City	10	55	41	6	13	72	43	33	4	1030	478
Sept'r, Oct'r, Nov'r.	Sackett's Harbor .	36	140	6	21	317	65	74	33	6	1332	369
	Thunder Bay.....	19	28	33	50	265	71	81	38	7	1265	314
	Superior City	22	54	20	16	33	60	18	39	0	1153	521
Dec'r, Jan'y, Feb'y.	Sackett's Harbor .	6	136	7	8	252	76	37	34	9	1266	105
	Thunder Bay.....	37	18	51	95	232	56	50	33	3	1310	130
	Superior City	10	55	42	10	15	62	16	29	0	1255	314
Mar., April, May.	Sackett's Harbor .	13	106	10	19	231	98	31	1	10	1037	273
	Thunder Bay.....	22	34	46	92	123	16	28	47	13	1064	176
	Superior City	14	72	26	5	13	44	4	34	0	855	395
Total for 3 years.	Sackett's Harbor .	65	441	27	55	1055	430	219	71	31	4684	1336
	Thunder Bay.....	109	96	155	329	813	209	194	158	38	4807	1082
	Superior City	56	236	129	37	74	238	81	135	4	4293	1708

Table of direction and prevalence of the winds, &c.—Continued.

TABLE 7.—HIGH BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor	43	162	31	15	158	167	121	17	28	887	1816
	Thunder Bay	203	44	56	142	148	29	15	72	38	919	1835
	Superior City	26	164	88	13	9	47	25	31	3	961	1853
Sept'r, Oct'r, Nov'r.	Sackett's Harbor	54	217	30	56	177	53	81	55	15	1355	1552
	Thunder Bay	206	56	96	167	195	38	34	149	18	1715	1200
	Superior City	46	157	80	11	20	22	27	93	4	1436	1525
Dec'r, Jan'y, Feb'y.	Sackett's Harbor	61	184	49	15	209	59	60	68	44	1736	1550
	Thunder Bay	147	50	68	138	222	88	105	143	27	2370	808
	Superior City	16	37	45	24	10	143	39	72	0	1208	1642
Mar., April, May.	Sackett's Harbor	47	254	20	12	140	109	66	27	59	1165	2166
	Thunder Bay	164	67	182	140	132	16	20	135	43	1609	2382
	Superior City	37	251	91	35	8	41	34	80	0	1551	2460
Total for 3 years.	Sackett's Harbor	205	819	130	98	684	388	331	167	146	5143	7084
	Thunder Bay	720	217	402	587	696	171	174	499	126	6613	6315
	Superior City	125	609	304	83	47	323	125	276	7	5156	7880

TABLE 8.—LOW BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor	87	128	11	10	289	290	171	23	10	1637	1031
	Thunder Bay	240	47	83	100	211	77	49	317	24	1963	1218
	Superior City	29	88	54	7	15	106	97	68	8	1661	991
Sept'r, Oct'r, Nov'r.	Sackett's Harbor	84	186	10	26	377	133	334	157	9	2411	675
	Thunder Bay	112	51	46	57	304	102	178	214	13	2511	619
	Superior City	39	83	28	31	42	128	60	131	1	2185	1029
Dec'r, Jan'y, Feb'y.	Sackett's Harbor	40	178	11	11	264	180	243	162	9	2359	260
	Thunder Bay	152	46	52	97	255	78	111	259	8	2392	278
	Superior City	16	75	65	18	20	127	45	98	0	2162	717
Mar., April, May.	Sackett's Harbor	58	146	10	19	252	287	158	36	15	1913	500
	Thunder Bay	114	38	64	101	151	33	82	171	21	1877	443
	Superior City	17	103	37	6	17	68	29	75	0	1532	728
Total for 3 years.	Sackett's Harbor	269	638	42	66	1182	890	906	378	43	8320	2466
	Thunder Bay	618	182	245	355	921	290	420	861	70	8743	2538
	Superior City	101	349	184	62	94	429	231	372	9	7540	3463

Table of direction and prevalence of the winds, &c.—Continued.

TABLE 9.—RISING BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor	155	302	30	15	174	184	174	40	23	1525	......
	Thunder Bay	534	79	129	71	51	27	47	277	47	1792	......
	Superior City	47	162	80	4	5	75	91	84	13	1685	......
Sept'r, Oct'r, Nov'r.	Sackett's Harbor	121	242	23	28	137	129	406	233	13	2201	......
	Thunder Bay	362	91	68	44	102	49	157	397	24	2755	......
	Superior City	77	108	50	23	14	132	81	232	5	2250	......
Dec'r, Jan'y, Feb'y.	Sackett's Harbor	106	199	25	8	71	158	295	256	26	2524	......
	Thunder Bay	337	79	38	24	81	62	164	517	29	3140	......
	Superior City	20	48	42	21	15	204	80	144	0	2035	......
Mar., April, May.	Sackett's Harbor	118	253	6	10	90	332	260	84	44	2000	......
	Thunder Bay	347	101	161	44	76	22	78	355	43	2138	......
	Superior City	38	198	67	10	11	49	58	143	0	1918	......
Total for 3 years.	Sackett's Harbor	500	996	84	61	472	803	1135	613	108	8250	......
	Thunder Bay	1580	350	396	183	310	160	446	1546	143	9855	......
	Superior City	182	516	239	58	45	460	310	603	18	7888	......

TABLE 10.—FALLING BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor	17	116	20	21	432	406	178	20	36	2032	2232
	Thunder Bay	83	33	63	252	436	124	63	53	54	2386	1667
	Superior City	33	209	112	26	29	114	68	75	10	2211	2170
Sept'r, Oct'r, Nov'r.	Sackett's Harbor	58	339	31	69	571	140	121	78	18	2875	1478
	Thunder Bay	57	47	11	224	543	116	130	78	14	3007	1045
	Superior City	42	181	95	27	65	138	47	61	1	2525	1642
Dec'r, Jan'y, Feb'y.	Sackett's Harbor	17	300	43	26	532	59	58	38	37	3078	944
	Thunder Bay	70	60	120	246	565	146	127	45	12	3478	582
	Superior City	32	107	105	33	37	182	44	67	0	2804	1325
Mar., April, May.	Sackett's Harbor	19	358	33	52	307	120	89	17	55	2314	1805
	Thunder Bay	67	67	212	290	307	36	62	80	48	1720	1534
	Superior City	44	262	100	39	22	76	26	76	0	2374	2178
Table for 3 years.	Sackett's Harbor	111	1113	127	168	1932	825	446	153	146	10299	6459
	Thunder Bay	277	207	506	1012	1851	422	382	256	128	11591	4828
	Superior City	151	759	412	125	153	510	185	279	11	9914	7315

Table of direction and prevalence of the winds, &c.—Continued.

TABLE 11.—MEAN BAROMETER.

Months.	Stations.	North.	Northeast.	East.	Southeast.	South.	Southwest.	West.	Northwest.	Calms.	Cloudiness.	Clearness.
June, July, August.	Sackett's Harbor	42	128	8	11	159	133	57	40	20	1043	1479
	Thunder Bay*	174	21	55	81	128	45	46	41	25	1301	1057
	Superior City	25	119	50	10	10	39	37	55	12	1274	1533
Sept'r, Oct'r, Nov'r.	Sackett's Harbor	41	178	14	15	154	95	112	59	7	1370	620
	Thunder Bay	101	31	37	42	146	25	75	112	7	1571	575
	Superior City	38	49	37	8	17	49	41	69	1	1163	828
Dec'r, Jan'y, Feb'y.	Sackett's Harbor	22	137	8	8	130	38	52	64	13	1407	450
	Thunder Bay	108	43	38	35	169	42	75	161	6	1856	258
	Superior City	20	43	37	12	22	116	39	41	0	1469	791
Mar., April, May.	Sackett's Harbor	32	211	9	31	97	156	115	38	25	1236	994
	Thunder Bay	136	63	127	93	101	9	38	129	27	1372	594
	Superior City	28	106	39	8	15	27	16	64	0	1209	700
Total for 3 years.	Sackett's Harbor	137	654	39	65	540	422	336	201	65	5056	3543
	Thunder Bay	579	158	257	251	544	121	234	443	65	6100	2484
	Superior City	111	317	163	38	64	228	133	229	13	5115	3852

HOURLY OBSERVATIONS AT THUNDER BAY.

A series of 2,328 hourly observations were made at Thunder bay. They were began in February, 1860, during which month there were five days on which observations were made hourly. In the month of March, 1860, there were eight days on which they were made, and in all the other months of 1860 there were four days of hourly observations made in each month. In each of the months of January, February, March, April, May, and June, 1861, there were eight days of hourly observations. They were then suspended. The following tables exhibit, 1st, the mean diurnal variation of atmospheric pressure; 2d, mean diurnal variation of temperature; 3d, mean diurnal variation of the elastic force of vapor; 4th, mean diurnal variation of the relative humidity of the air; 5th, mean diurnal variation of cloudiness of the sky; 6th, mean diurnal variation of the force of the winds without reference to its direction; and 7th, mean diurnal variation of the direction and force of the winds:

1st. *Mean diurnal variations of atmospheric pressure.*—There is a great diversity of the diurnal variation in the different months. This is caused in a great measure by the irregular times of taking the observations during the month, and in those months on which only four days of observations were obtained, the series is not long enough to get good average results. The greatest anomaly is in the month of December. In this month there is an almost uninterrupted rise of pressure from 1 a. m. till 12 midnight. The minimum pressure is at 1 a. m., from which time until 1 p. m. it rises regularly. At 2 p. m. there is a slight depression. It then rises until 8 p. m., when there is again another slight depression, whence it rises gradually to its maximum at 12 midnight. The proportion of cloudiness in this month is larger than in the others, with the exception of November, and, moreover, the relative order of their variation is reversed, the hours of greatest cloudiness being from 10 p. m. until 4 a. m., whereas in all the other months the greatest amount of cloudiness is in the day. The hours 10 p. m., 12 midnight, 2 and 3 a. m. were entirely cloudy throughout the series. It would appear from this that the formation of clouds, and the alternation of local winds, which on shores are called land and sea breezes, have a decided effect to modify the diurnal variations of the barometer, the laws of which are not yet well established by learned meteorologists. July is another anomalous month. In this month the atmospheric pressure is low at 1 a. m. It falls, with a single slight interruption at 8 a. m., until 9 a. m., when its minimum occurs. In this month, also, the hourly distribution of the cloudiness is different and quite opposite to that of December; the greatest amount being in the morning hours, from 1 to 6 a. m., and then gradually decreasing until 11 p. m. In neither of these months is there any semi-diurnal curve of the barometric pressure. The atmospheric pressure in August increases slightly from 1 until 7 a. m., when its maximum occurs, from which time it regularly decreases until 6 p. m., when its minimum occurs, after which it regularly increases in pressure until 12 midnight. There is no double maximum and minimum in this month. In September the pressure increases from 1 till 8 a. m. It then, alternately, rises and falls nearly equally every hour until 5 p. m., when it increases rapidly until 12 midnight, when its maximum occurs. Its minimum is at 1 a. m. There is no semi-diurnal wave of pressure. In October the pressure diminishes from 1 to 4 a. m., when its minimum occurs. It then increases as rapidly until 9 a. m., the period of its maximum, which rests until 10 a. m., from which time it diminishes until 1 p. m., the period of its second minimum. It again rises rapidly until 9 p. m., when its second maximum occurs. In this month there is a decided semi-diurnal wave of pressure. In November the pressure increases from 1 till 9 a. m., when its maximum occurs. It then decreases until 3 p. m., with a slight tendency to rise at 5 p. m., and it falls to its minimum at 12 midnight. There is a slight tendency to a semi-diurnal wave in this month. It should be remembered that during the foregoing months but four days of hourly observations were made, the number of observations being entirely too small to give the average horary differences of atmospheric pressure, covered as they are by the irregular influences of storms, winds, &c. In all of the six months in which the hourly observations were made oftener than four days per month, with the exception of January, embracing parts of two years, the semi-diurnal variations are prominently manifested. The variations of pressure in the different months are generally very similar; the morning minimum being very distinct. In January and February it occurs at 5 a. m.; in March at 2 and 3 a. m.; in April at 4 a. m., and in May at 3 a. m. June is the only month where the minimum is exhibited so early as at 1 a. m. The morning maxima of January, February, and June occur at 10 a. m.; in April at 9 a. m., and in March and May at 11 a. m. The evening minima of January and February occur at 2 p. m.; in March and April at 4 p. m., and in May and June at 6 p. m. The evening maximum pressure in January and February is retarded till 12 midnight, but there is a tendency to depression after 8 p. m. In March and May the evening maximum pressure is at 9 p. m.; in June at 10 p. m., and in April at 11 p. m. In the mean semi-diurnal curves of pressure the morning minimum is at 2 a. m., and the maximum at 10 a. m. The evening minimum is at 4 p. m., and the evening maximum is at 10 p. m.

The times of the minimum and maximum pressures at Thunder bay, compared with those in tropical regions, agree very well, except the morning minimum at Thunder bay anticipates the tropical by about two hours. At Bombay the morning minimum and maximum pressures are higher than the evening. At Thunder bay they are the reverse, the morning minimum and maximum being lower than the evening; a fact worth further investigation, as in arctic regions, according to Dr. Kane's observations, the barometer at the period of the evening maximum is very much higher than at any other period. Since corrections for horary variations are an essential element in the nice determination of the elevations of mountain heights, a knowledge of the laws by which they are governed becomes of the highest practical importance. These variations, in tropical regions, are so regular that the time of day may be approximately indicated by the movements of the barometer. As more northern latitudes are successively approached the amplitudes of variation are diminished, while the non-periodical and irregular variations which are believed to be caused principally by the action of the winds, in connexion with the expansion and density of the atmosphere, produced by the radiation and absorption of caloric, are increased. The range of diurnal variation at Bombay, within the tropics, is .094 of an inch. At Philadelphia, near latitude 40°, it is .059 of an inch. At Thunder bay, near latitude 45°, it is .041 of an inch. At the Greenwich Observatory, near latitude 51° 30′, it is .021, and at Van Rensselaer bay, near latitude 78° 30′, it is .012 of an inch. At all of the stations above 40° of latitude, these diurnal variations are so covered by the irregular fluctuations that they can only be made manifest by the tabulation of a large number of observations. At all of them, with the exception of the one in the arctic regions, there is a double maximum and a double minimum. The maxima occurring generally a few hours before noon and midnight, and the minima taking place a few hours before sunrise and sunset. In the arctic regions, according to Dr. Kane's observations, the lowest ordinates of the barometer occur at one and two p. m., when the maximum of temperature takes place. An appreciable curve, however, can scarcely be perceived, even when the ordinates of the actual rise of the mercury are magnified to five times its natural place in the scale. It was asserted by Mr. Redfield that Professor Forbes has shown that in very high latitudes the usual effect is reversed, the minimum being at ten, and the maximum at three o'clock. We do not know, however, where a sufficient number of observations have been tabulated to ascertain this important fact with certainty, excepting those of Dr. Kane, which have been reduced and ably discussed by C. A. Schott, assistant United States coast survey, and published in the Smithsonian Contributions to Knowledge.

M. Kaemtz, in his "Complete Course of Meteorology," alleges it as probable that this phenomenon is due to the calorific action of the sun; M. Dove has assigned another cause of these variations: the pressure of the atmosphere on the barometer, being equal to the sum of the pressures of the dry air and the vapor of water, the barometric column is composed, so to speak, of two parts, one corresponding to the air, the other to the vapor of water. Now, when the temperature rises the density of the air diminishes, but the tension of the vapor increases. Professor Forbes and Mr. Redfield, from the fact that in high latitudes the usual effect is reversed, suggest that this oscillation appears to indicate a system of atmospheric tides resulting from the rotation of the earth, and its relation to the solar system. Mr. Hopkins refers the cause to the daily condensation of the vapor in the atmosphere, and its subsequent evaporation there. Mr. Espy, in a paper read before the British Association for the Advancement of Science, entered elaborately into the discussion of this question, failing, however, to convince Professor Forbes of the truth of his theory, the gist of which is, that the daily oscillations of the barometer are caused by the upward and downward motion of the particles of air and moisture as they are separated or approximated by the change of temperature. The particles weigh more while the rate of separation is increasing, and less while it is diminishing. On this, Professor Henry remarks that, although it may be a true cause, yet he is not certain that it is a sufficient one. Such, in brief, are the opinions and theories of the most celebrated meteorologists on this subject. The observations at Thunder bay, in connexion with many other well-established facts in meteorology, would seem, in our opinion, to go far to establish direct causes fully adequate to explain all the circumstances connected with this phenomenon. The depression of the barometer at four p. m., and its subsequent elevation at ten p. m., are normal, or in accordance with the diurnal variations of temperature in causing those motions. The morning depression and subsequent ten o'clock a. m. elevation of the mercury in the barometer are abnormal or in *opposition to* the action of heat in rendering the air less dense and weighty.

They must, therefore, be accounted for by some other cause. Early in the afternoon and by six p. m. a stiff land breeze has set in from the west, which continues at a maximum force until about eleven or twelve o'clock at night. The greater differences between the wet and dry bulb thermometers from twelve to four p. m. proves that the air is dryer, and the rapid night radiation, together with its motion during the night toward the warmer air over the water, or now radiating surface, that it is heavier than the sea air. Upon meeting with this moister air after twelve midnight, and from that until about four a. m., the dew point becomes considerably reduced, and condensation of the vapor into cloudiness takes place to a large extent, which is evinced by the observations on the clouds for those hours. This condensation is well known to give out a very large amount of free caloric, which had previously been held latent by the gaseous vapor. It is thus that the depression of the barometer from twelve midnight to four a. m. is produced. But this levity of the air at this time and from this cause, it must be remembered, takes place in the clouds, and at such elevations that the thermometer at the surface does not indicate it. This peculiar relation of heated air above the cooler air below has frequently been proved by observations in the balloon. This is so well established that it forms an exception to the law of decrease of temperature with the elevation above the level of the sea within a certain range. The late lamented Espy, in his great work, "Report on the Meteorology of the United States," adduces numerous cases to show the application of this truth to explain many other seeming paradoxes in meteorological science. From three or four till ten a. m. there is an increase in the weight of the atmosphere, and the true difficulty in this question is to account for this abnormal rise of the barometer. From this time the wind from radiating surfaces, or land breeze, which at Thunder bay is a west wind, ceases, and an east or sea wind from a partial non-radiating surface supervenes, which at first is very gradual, but at six a. m. it becomes stiff and increases until eleven a. m. Its commencement with the rise of the barometer, and gradual cessation as soon as the barometer begins to fall, would indicate either that they are cause and effect to each other, or that they are both subject to a common cause. Mr. Hopkins attempts to account for this abnormal rise by dropping his condensation theory for the moment, and employing additional vapor to the weight of the atmosphere, caused by the increase of heat when the sun rises. If this were true, then the barometer should continue to rise as long as the cause, without modification, continues in action. But, instead, we find the barometer falls after ten a. m., notwithstanding the increased amount of vapor superadded to the atmosphere long afterwards. This fact is fatal to the theory. This fall of the barometer is the direct consequence of the mid-day sun rendering the air lighter, the postponement of its intensity being in exact proportion to the time required for the changes to take place, as the intensity of the heat of the sun is exhibited two hours after he has passed the meridian, the absolute period of his greatest power. In consequence of the less or comparative non-radiation of some places compared with others, and especially water compared with land, the process of heating and cooling the atmosphere is retarded in the one place and accelerated in the other. In the morning after six a. m. the relations of the air over unequally proportioned radiating and non-radiating surfaces become changed, the non-radiating surface becomes relatively cooler, the land or radiating surface, drinking in and absorbing the rays of the sun, becomes warmer, the sea breeze is set in motion and carries the cold air in such abundance as to raise the barometer. This is accomplished by two agencies: first, by rendering the air more heavy and dense, by the abstraction of caloric; and second, by comparatively accumulating the air over the region of observation, by the meeting and opposition to each other of the refluent east and west winds. There are so many instances of atmospheric accumulation by obstructions to the winds, causing a rise in the barometer, and of contrary effect in depressing it, that we need not stop to discuss this question. It is from this obstruction of the winds, in connexion with the sudden evolution of free caloric, by the condensation of vapor into clouds, in the upper regions of the atmosphere, reacting upon each other, that the great irregular fluctuations of the barometer occur in northern latitudes and in the winter. The covering of the sky by clouds is well known to prevent radiation. In connexion with this subject the tracings of the variation of the barometer during the hours for the month of December, with the observations on the clouds, are instructive. We have, to be sure, only four days of hourly observations during this month, but they are sufficient to give an approximation to the true result. In this month the amount of cloudiness from nine p. m. to four a. m. is .928, or within .072 of being entirely covered. This proportion is much larger for those hours than for any other month of the year. The barometer, so far from having the usual diurnal wave, commences to rise at one a. m., and continues, with two exceptions, (one at two p. m., the other at nine p. m.,) to rise until midnight. All the other months excepting July have a double rise and fall sufficient to give the usual curve and proportions in the general mean.

2*d*. *Mean diurnal variations of temperature.*—The diurnal variations of the temperature at Thunder bay, represented by a mean curve for the different hours of all the months is very regular, the minimum temperature being at 5 o'clock a. m., and thence rising to the maximum at 2 p. m. It then falls until 12 midnight. At this hour the temperature is above the 5 o'clock minimum, but below the ordinate for 1 a. m.

The maxima and minima of the different months are neither in the order of the mean, nor of each other, the hours of each varying considerably. The maximum of January is at 2 p. m., but a secondary minimum occurs at 12 midnight, which, however, is only .2 of a degree below the morning minimum, which occurs at 7 a. m. The maximum of February is at 2 and 3 p. m., while the morning minimum, at 7, is .2 of a degree above an accidental or secondary minimum occurring at 3 a. m. There is very little variation of the hours for December, a distinct but slight maximum occurring at 1 p. m. The primary or morning minimum is not eliminated, the secondary minimum at 1 a. m. being the actual minimum. The variations for March are quite normal and regular, the maximum being at 1 p. m. and the minimum at 6 a. m. The curve of variation for April is irregular. The actual minimum is secondary at 1 a. m., but it is only .1 of a degree below the 4, 5, and 6 o'clock a. m. ordinates. From 9 p. m. until 6 a. m. the ordinates only vary .4 of a degree, including the minimum at 1 a. m. The maximum occurs at 3 p. m. The curve of variation for May is somewhat irregular, the minimum being at 5 a. m. and the maximum is prolonged until 5 p. m. The curve of June is almost like that of May, excepting that the minimum occurs at 4 a. m. The maximum, like that of May, is at 5 p. m. The variations of July are irregular, there being no elimination of the morning minimum, the secondary one being at 12 midnight. The maximum is at 2 p. m. The minimum of August is at 5 a. m., and the maximum at 3 p. m. The curve for September is again quite irregular. A distinct morning or primary minimum occurs at 6 a. m., but the actual minimum is at 12 midnight, which is considerably lower than the morning one. The maximum anticipates the usual time at 12 noon. The curve of October is very similar to that of September, the maximum being at 12 noon and 1 p. m. The secondary minimum is at 12 midnight, while the morning minimum, at 6 and 7 a. m., is considerably above the other. The minimum in the curve for November is at 6 a. m., and the maximum at 1 p. m., but the ordinates for 9, 10, and 11 p. m. and 12 midnight run anomalously high, being nearly equal to the maximum.

Although the hourly observations at Thunder bay, with regard to temperature, show very fair generalizations, yet it is plainly to be perceived that had they been more regular, and extended over a longer series of time, much better results would have been obtained. Most of the irregularities occur in those months in which but four days of hourly observations were taken. Another cause of discrepancy is the want of consecutiveness in connecting the hours of 12 midnight with 1 a. m., in every case of which, during the whole series, there are intervals of from 4 to 8 days. This is especially noticeable in the mean curve of the barometer, the ordinates of 12 midnight being so high, and those for 1 a. m. so low. The approximations are, however, sufficiently close to indicate the rise of temperature in the morning to be in strict accordance with the times of sunrise in the different seasons of the year. In winter the temperature does not begin to rise until after 7 a. m. In March, April, September, October, and November, it begins at about 6 o'clock in the morning. In August, May, and mean of the whole year, it begins about 5 a. m., and in June and July at about 4 a. m. The temperature generally attains its maximum in the autumn and winter months at, say, from 12 noon to 2 p. m. In the spring and summer months it is later, say, from 3 to 5 p. m.

A reference to the profiles of the temperature on the diagram will exhibit the foregoing facts at a glance.

3*d*. *Mean diurnal variations of the elastic force of vapor.*—These values are derived from observations on the differences of the readings of the wet and dry bulb thermometer, by means of Prof. Guyot's psychrometrical table No. 7, published by the Smithsonian Institution, giving, in English inches of mercury, the elastic force of vapor contained in the air. The general feature of the hourly curve is very nearly parallel with that of the hourly curve of temperature. But there is this difference, the intensity of the elastic force occurs at 12 noon, whereas the intensity of the temperature does not arrive at its greatest degree until about 2 p. m. At 1 p. m. the diminishing force of vapor is too rapid, and its force too low, to be accounted for by the increasing heat of the sun, which goes on accumulating until about 2 p. m. According to our observations, the intensity of the elastic force is augmented at 9 p. m., while that of the sun is diminished, which is contrary to the recognized theory of their relative forces. These anomalies might, however, be eliminated by a more extended series of observations, and greater regularity in the time of taking them.

4*th*. *Mean diurnal variations of the relative humidity.*—This element is also obtained from the differences of the wet and dry bulb thermometer observations, reduced by Guyot's psychrometrical table No. 7, and is expressed in thousandths, 1,000 being considered the point of full saturation. The rapid decrease of the values by the computations when the temperatures are low, and the slow decrease when the temperatures are high, produce a diurnal curve nearly opposite to that of the temperature. In other words, the minimum of relative humidity is at 1 to 3 p. m., while the maximum is at 3 to 5 a. m. The curve is not so even as that of the temperature, probably in consequence of the difficulty of getting the true differences between the two instruments, especially in temperatures near the freezing point.

5*th*. *Mean diurnal variation of the amount of cloudiness.*—In the representation of cloudiness by numbers, 0 is considered a clear sky, and 10 the sky entirely covered by clouds. Partial states of cloudiness are represented by the intermediate numbers. For the month of January the greatest amount of cloudiness is at 4 a. m., 10 p. m., and 8 p. m. The greatest amount of clearness being at 6 a. m., 3 p. m., and 12 midnight. In February the greatest amount of cloudiness is at 5 p. m., and the least at 3 a. m., the clearest part of the day being from 8 p. m. until 3 a. m., and the cloudiest from 4 a. m. until 7 p. m., exhibiting in general but one maximum and one minimum; a marked prevalence of the clouds being in the day, with a corresponding clearness at night. In March there are 2 maxima and 2 minima. The 1st maximum is at 6 p. m. and the 2d at 9 a. m., the 1st minimum at 4 a. m. and the 2d at 11 p. m.

In this month also the greatest amount of cloudiness in the daytime is especially marked. In April the maximum of cloudiness occurs at 8 a. m., and the minimum at 8 p. m., with a preponderance of cloudiness of the day over the night. In May the maximum of cloudiness is at 2 a. m., and the minimum at 11 p. m. In this month the greatest amount of cloudiness is in the morning hours from 1 till 6 a. m., and the greatest clearness from 6 p. m. till 12 midnight. There is a slight preponderance of cloudiness in the day. In June the maximum occurs at 4 p. m., and the minimum at 11 p. m., the day having the larger amount of cloudiness, the difference, however, being but small. In July the maximum of cloudiness is at 4 a. m., and the minimum at 10 and 11 p. m., the clearness and cloudiness being about equal day and night. In August the maximum is at 6 p. m. and the minimum at 10 p. m., the day being the most cloudy. September gives the maximum at 6 p. m., and the minimum at 9 p. m., the day being the most cloudy. October has the maximum at 1 p. m., and the minimum at 12 midnight, the day being considerably the most cloudy. In November the hours of 7, 8, 10, and 11 a. m., 12 noon, and 1, 2, 4, 5, 6, and 7 p. m., were entirely clouded, the minimum being at 5 a. m. The numbers at 12 midnight and 2 a. m. are within one figure of the minimum, making the day the most cloudy. In December the maximum or entire cloudiness is at 2, 3, and 8 a. m., at 10 p. m., and 12 midnight. The minimum is at 10 a. m. In this month, contrary to all others, the night is decidedly the most cloudy. In the mean of all the months at the different hours, the highest amount of cloudiness occurs at 8 a. m., represented by .723. The next highest is at 4 p. m., .708. At 5 p. m. it is .699, at 11 a. m. and 1 p. m. it is .696, and at 10 a. m. .694. The smallest amount of cloudiness occurs at 11 p. m., .508, the next at 12 midnight, .520. At 9 p. m. it is .531, at 10 p. m. .535, and at 8 p. m. .596, the day being decidedly the most cloudy. The average of the hours from 6 in the morning till 6 in the evening is .691, while the same hours from evening till morning give .618. The 6 hours from 12 midnight to 6 a. m. give .679, from 6 a. m. to 12 noon .693, from 12 to 6 p. m. .689, and from 6 p. m. to 12 midnight .557.

6th *Mean diurnal variation of the force of winds.*—The hourly observations of the winds for the months of July, August, September, October, November, and December, being during but four days in each, are not sufficient to eliminate the causes that vary the forces of the winds. But by massing and averaging the numbers of those months, viz: from January to June, inclusive, where from 8 to 16 days in each were observed, it is seen by the curve that the increase and diminution of the force take place nearly at the same hours that the clouds are increased and diminished. It also exhibits a decided semi-diurnal curve, or double maxima and minima. The increase of force begins at 2 p. m., and rises until 9 a. m., when a diminution of the force takes place, falling until about 2 p. m. After this time it rises moderately, with slight variations, until 8 p. m., from whence it falls to its morning minimum.

7th. *Mean diurnal variation of the direction and force of the winds.*—By analyzing the different kinds of winds and tabulating their direction and forces under their appropriate heads, for the different hours, very manifest sea and land breezes are demonstrated in the east and west winds at Thunder bay. This is done in table 7.

Although indications of a semi-daily flux and reflux are shown in the southeast and northwest winds, yet they are so much influenced by other causes that this character is not so unmistakable as in the eastern and western winds. By reference to the topography of Thunder bay, it will be seen that the east wind has a scope of a little more than a hundred miles over Lake Huron at its widest portion, and by embracing a part of the Georgian bay it is still wider. From the eastern shore of Lake Michigan to Thunder bay, the west wind has about an equal scope overland. A reference to the table and diagram very plainly proves that the east wind from the lake is much more abundant, and blows with greater force from 6 a. m. till 6 p. m.; while the west wind or land breeze blows with greater force from 5 p. m. until about 5 a. m., alternating with each other quite regularly day and night. What are the causes of land and sea breezes? At the first blush there would appear to be but little interest involved in the solution of this question, but when we consider that there are other and more important principles of meteorology involved in the same category, holding intimate relations with it, either as cause or effect, it presents a view well worthy of investigation. Meteorologists are not harmonious in their opinions of the cause or causes of this phenomenon. The one generally received is, that as the air overland is heated by the rays of the sun more rapidly than that over the sea, the air becoming specifically lighter by the expansion of heat, the comparatively cold and more heavy air from the sea takes its place, causing the sea breeze in the daytime. On the other hand, thes ea having a much less power of radiation than the land, the heat of the sea is accumulated and retained until night, making the air lighter over the sea than that of the land whose heat has been rapidly radiated into space, which causes the heavier air of the land to flow towards the sea at night. The unequal heating of mountains and plains, and the unequal radiation of forests and sandy plains, or regions but slightly covered with vegetation, exhibits in many places the same phenomenon, to wit: a regular day and night flux and reflux of winds in opposite directions. These are very conspicuous in the mountains and valleys of Switzerland, where they are pointed out by M. Fournet, as quoted in a note by Kaemtz. Mr. Hopkins, an English writer upon this subject, advances a different theory. He says, "daily sea breezes are not consequences of air, heated by the surface of the land, rising and admitting other and cooler air from the sea to flow into the comparative vacuum thus made; but these breezes are the results of condensation of atmospheric vapor which, in each instance, produces an ascending aërial current that causes the flow of the adjoining air into the vacuum; and, in the absence of the sun, the air, which had been warmed by the condensation of vapor, becomes cool and flows back, thus producing daily alternating sea and land breezes." To prove that merely sun-heated lands are not the causes of land and sea breezes, he cites, among others, the western coast of Africa and the hot dry sandy deserts in the interior, where it is said they do not prevail. But it should be remembered that alternate land and sea breezes must necessarily, from their diurnal action, have only a limited extent. Their effects can only reach so far as can be traversed by the breeze, let it be gentle or otherwise, within the time of its change, say six to eight hours, for there must be some time allotted to the two semi-daily calms in the twenty-four hours. At Thunder bay the interchange of east and west winds occur at about 5 a. m. and 5 p. m. The comparative calm of east wind is from 9 p. m. till 3 a. m., and the west wind from 8 a. m. till 4 p. m. The wind must then flow at the rate of twelve to sixteen miles per hour, to cover the seaward and landward position of Thunder bay. To render the argument of Mr. Hopkins tenable, the winds off the shores of Africa would have to blow at the rate of from 100 to 300 miles per hour, the extent of the desert eastward being at least eighteen degrees of longitude. In consequence of their extent, it is well known that they are the cause of the monsoons which change with the changes of the season of the year, instead of with the daily revolutions of the earth. Maury, in his Physical Geography of the Sea, has graphically and beautifully delineated the effect these deserts have upon the winds. In this case, however, the dispute is on a subordinate point of the subject, both parties agreeing that it is the alternate heating and cooling of the air which produces the effect; one party attributing the cause of heat to the direct rays of the sun in the day and the radiation at night, the other to the alternate condensation of vapor and evaporation of clouds. It is very probable that both causes united, or singly, are concerned in the phenomenon, and that they occur in greater or lesser degree, all over the globe, wherever the physical aspects of nature are so unequally distributed, in regard to variation and extent, as to be brought within the fluctuating influence of the diurnal movements of the earth. If such be the facts, (and there are a thousand concurring circumstances to corroborate the truth of their reality,) there are other important branches of meteorological inquiry subject to the same laws and to be governed by the same rules. The semi-diurnal rise and fall of the barometer is one that has puzzled many, if not all, who have attempted to investigate and account for it.

Very respectfully, your obedient servant,

JOHN M. BIGELOW.

Colonel J. D. GRAHAM,
Corps of Engineers, U. S. Army, Superintendent U. S. Lake Survey.

TABLE 1.

Mean diurnal atmospheric pressure at Thunder Bay, Michigan, barometer reduced to 32° Fahrenheit, computed from observations made from February 1, 1860, *to June* 30, 1861.

Hour.	January. 8 days.	February. 13 days.	March. 16 days.	April. 12 days.	May. 12 days.	June. 12 days.	July. 4 days.	August. 4 days.	September. 4 days.	October. 4 days.	November. 4 days.	December. 4 days.	Total.
1 a. m.	303.1	278.6	233.5	246.4	307.4	345.4	236.2	373.0	230.7	258.0	351.2	360.5	293.6
2 a. m.	282.5	245.4	226.8	246.5	304.7	350.4	225.2	375.5	234.2	251.2	354.7	368.0	288.7
3 a. m.	291.3	240.0	226.8	251.6	303.1	358.2	220.7	377.2	241.3	248.2	355.2	376.7	290.8
4 a. m.	281.1	242.6	234.6	241.9	315.8	371.1	212.7	382.0	248.5	223.7	366.0	382.5	291.8
5 a. m.	279.6	237.4	235.7	252.9	325.0	378.5	210.7	385.5	255.0	239.5	366.2	391.5	294.8
6 a. m.	290.0	261.5	243.7	252.6	336.1	386.3	200.2	382.2	255.0	240.0	370.7	398.2	301.3
7 a. m.	303.5	267.2	254.3	259.9	351.4	393.1	195.7	385.2	268.8	247.5	374.3	421.0	310.1
8 a. m.	308.6	269.5	251.8	259.6	361.0	408.2	200.7	383.2	278.0	254.7	379.5	445.2	316.6
9 a. m.	310.0	277.6	257.8	261.0	363.9	416.8	191.7	374.2	272.8	260.7	384.0	464.0	319.5
10 a. m.	319.5	284.1	262.1	259.7	369.4	419.5	197.0	364.0	277.0	260.5	382.5	482.5	323.1
11 a. m.	318.1	280.5	264.3	251.3	381.1	418.1	198.7	354.0	275.0	251.7	374.2	489.0	321.5
12 a. m.	294.5	266.5	251.1	249.6	371.4	413.8	199.7	345.0	277.5	247.2	365.5	492.5	314.5
1 p. m.	282.7	253.9	249.6	250.0	368.2	410.6	202.7	342.2	270.5	239.2	351.5	494.7	309.6
2 p. m.	278.1	245.4	245.2	236.5	365.5	405.1	205.5	335.0	273.7	247.2	350.5	493.5	306.7
3 p. m.	278.5	248.6	237.5	224.5	359.2	399.0	213.5	323.7	273.2	261.2	350.0	504.2	306.0
4 p. m.	285.0	246.5	234.3	219.5	357.1	387.6	216.2	318.2	279.2	262.2	354.2	509.5	305.8
5 p. m.	288.7	261.2	250.9	227.8	352.2	388.3	229.0	312.7	276.8	271.5	356.0	512.7	310.6
6 p. m.	300.8	271.9	257.8	237.5	348.4	388.8	230.0	309.2	285.0	275.5	351.2	519.7	314.2
7 p. m.	317.5	277.9	260.4	244.8	358.5	389.8	233.7	312.0	298.8	294.2	344.5	521.7	321.1
8 p. m.	318.6	276.9	269.8	247.7	369.5	397.3	238.7	317.5	317.0	311.2	348.5	529.5	328.5
9 p. m.	315.6	283.4	273.6	247.7	377.0	403.6	237.5	314.7	330.0	323.0	340.0	525.5	330.9
10 p. m.	321.0	285.6	265.7	252.7	370.9	403.9	238.0	315.5	339.0	322.8	332.0	527.7	331.2
11 p. m.	326.6	287.7	260.8	253.2	357.5	403.3	242.2	321.0	344.0	317.5	331.2	528.8	331.1
12 p. m.	328.2	298.3	258.9	246.3	356.6	395.9	242.7	324.2	349.8	320.2	331.7	530.5	331.9

TABLE 2.

Mean diurnal variation of temperature of the air at Thunder Bay, Michigan, computed from observations from February 1, 1860, *to June* 30, 1861.

Hour.	January. 8 days.	February. 13 days.	March. 16 days.	April. 12 days.	May. 12 days.	June. 12 days.	July. 4 days.	August. 4 days.	September. 4 days.	October. 4 days.	November. 4 days.	December. 4 days.	Total.
1 a. m.	21.4	16.1	28.2	32.9	41.6	51.1	58.7	58.8	56.7	47.3	35.9	24.1	39.4
2 a. m.	21.2	16.4	27.9	33.1	41.7	50.5	58.3	58.7	56.6	47.3	35.7	24.2	39.3
3 a. m.	20.9	15.5	27.3	33.1	41.2	50.1	58.7	58.4	55.9	47.0	35.6	24.5	39.0
4 a. m.	20.6	16.3	29.9	33.0	40.8	49.7	59.4	58.0	55.8	46.6	35.3	24.8	38.9
5 a. m.	20.5	15.9	26.5	33.0	40.6	49.8	60.5	57.6	55.4	46.4	34.9	24.7	38.7
6 a. m.	20.3	15.9	26.0	33.0	40.8	58.8	61.1	58.5	55.1	46.1	34.8	24.8	38.9
7 a. m.	20.2	15.7	26.4	34.0	42.1	52.7	62.1	60.8	55.9	46.1	34.9	25.1	39.6
8 a. m.	20.3	16.1	27.8	34.9	43.3	54.1	62.9	62.8	57.2	46.4	36.0	25.3	40.5
9 a. m.	21.0	17.5	29.1	35.9	44.9	55.2	64.1	62.5	59.1	47.6	36.9	25.3	41.8
10 a. m.	21.8	18.4	30.1	36.6	45.0	56.1	64.6	66.8	60.4	49.8	37.6	25.9	42.7
11 a. m.	22.7	19.5	31.0	37.1	45.9	56.7	66.1	67.8	62.5	50.4	38.8	26.9	43.8
12 a. m.	23.5	20.6	32.2	37.9	46.0	57.0	65.6	68.5	62.6	51.8	39.4	26.7	44.3
1 p. m.	24.6	21.6	32.6	38.4	46.7	57.4	65.7	68.9	62.5	51.8	39.7	27.0	44.7
2 p. m.	24.7	22.2	32.4	39.3	46.5	58.3	66.4	69.3	61.7	51.5	39.0	26.6	44.8
3 p. m.	24.1	22.2	32.0	39.7	47.0	58.4	65.2	69.8	61.2	50.8	38.5	26.3	44.6
4 p. m.	23.2	21.7	30.7	38.6	47.6	58.9	64.5	68.9	62.5	50.3	38.0	26.3	44.2
5 p. m.	22.5	21.0	30.1	37.4	47.7	59.5	63.1	67.9	61.2	49.6	37.8	26.2	43.6
6 p. m.	21.5	20.5	29.0	36.8	47.1	58.5	62.3	66.2	59.3	48.5	37.7	25.7	42.7
7 p. m.	20.9	20.3	29.1	34.9	44.6	55.5	61.3	64.4	57.1	47.3	38.0	25.5	41.5
8 p. m.	20.6	20.2	28.9	33.5	43.2	53.1	58.5	63.1	55.0	46.7	38.1	25.3	40.5
9 p. m.	20.2	19.9	28.6	33.2	42.4	52.0	57.5	62.8	54.1	46.0	38.5	25.4	40.0
10 p. m.	20.1	19.9	28.2	33.3	41.5	51.4	57.0	61.8	53.4	45.3	38.4	25.7	39.6
11 p. m.	20.1	20.0	28.0	33.2	40.8	50.8	56.1	61.6	53.3	44.6	38.6	25.9	39.4
12 p. m.	20.0	20.0	27.8	33.3	40.6	50.5	55.2	61.2	52.9	44.1	38.9	25.8	39.2

TABLE 3.

Mean diurnal variation of the elastic force of vapor at Thunder Bay, Michigan, computed from observations on the wet and dry bulb thermometers, made from February 1, 1860, *to June* 30, 1861.

Hour.	January. 8 days.	February. 13 days.	March. 16 days.	April. 12 days.	May. 12 days.	June. 12 days.	July. 4 days.	August. 4 days.	September. 4 days.	October. 4 days.	November. 4 days.	December. 4 days.	Total.
1 a. m.	.1059	.0923	.1327	.1536	.2125	.3235	.4152	.4580	.4052	.2710	.1892	.1100	.2392
2 a. m.	.1051	.0921	.1310	.1553	.2296	.3226	.3877	.4552	.4067	.2782	.1840	1172	.2387
3 a. m.	.1064	.0902	.1277	.1543	.2293	.3158	.3912	.4550	.3982	.2780	.1870	.1152	.2373
4 a. m.	.1052	.0909	.1262	.1540	.2239	.3101	.3845	.4525	.3920	.2740	.1847	.1195	.2348
5 a. m.	.1051	.0889	.1252	.1543	.2227	.3075	.3917	.4432	.3863	.2787	.1865	.1140	.2337
6 a. m.	.1046	.0891	.1224	.1544	.2196	.3098	.3937	.4570	.3945	.2687	.1915	.1137	.2349
7 a. m.	.1044	.0864	.1225	.1540	.2201	.3264	.4397	.4780	.3892	.2667	.1982	.1080	.2411
8 a. m.	.1037	.0879	.1284	.1516	.2252	.3370	.4502	.4830	.4002	.2802	.1995	.1130	.2466
9 a. m.	.1047	.0903	.1302	.1602	.2271	.3436	.4582	.4992	.4057	.2735	.2047	.1130	.2508
10 a. m.	.1075	.0918	.1333	.1628	.2214	.3398	.4550	.5125	.4187	.2815	.2065	.1112	.2535
11 a. m.	.1072	.0929	.1336	.1649	.2264	.3507	.4577	.5207	.4295	.2780	.2120	.1137	.2572
12 a. m.	.1126	.0954	.1355	.1633	.2141	.3460	.4670	.5302	.4165	.2952	.2102	.1095	.2579
1 p. m.	.1141	.1024	.1358	.1680	.2164	.3200	.4595	.5362	.3852	.2932	.2140	.1067	.2543
2 p. m.	.1161	.1029	.1288	.1735	.2196	.3114	.4695	.5512	.3782	.2972	.2115	.1050	.2554
3 p. m.	.1124	.1017	.1268	.1725	.2218	.3490	.4554	.5570	.3590	.2898	.2062	.1100	.2551
4 p. m.	.1107	.1006	.1265	.1685	.2302	.3447	.4690	.5305	.3637	.2885	.2082	.1075	.2541
5 p. m.	.1046	.1003	.1216	.1633	.2371	.3296	.4307	.5345	.3625	.2797	.2057	.1092	.2482
6 p. m.	.0952	.0961	.1219	.1609	.2286	.3312	.4297	.5132	.3507	.2722	.2072	.1112	.2432
7 p. m.	.0971	.1001	.1286	.1551	.2126	.3220	.4392	.5092	.3567	.2700	.2135	.1087	.2427
8 p. m.	.0951	.1017	.1301	.1545	.2100	.3155	.3987	.4965	.3250	.2655	.2190	.1077	.2349
9 p. m.	.0965	.1016	.1318	.1591	.2141	.3190	.4002	.5125	.3212	.2592	.2187	.1095	.2368
10 p. m.	.0982	.1000	.1299	.1642	.2102	.3169	.3950	.4917	.3220	.2572	.2205	.1137	.2349
11 p. m.	.0974	.0999	.1327	.1619	.2044	.3150	.3830	.4787	.3137	.2517	.2240	.1167	.2314
12 p. m.	.0989	.1003	.1364	.1656	.2090	.3165	.3750	.4742	.3387	.2450	.2255	.1170	.2335

TABLE 4.

Mean diurnal variation of the relative humidity of the air at Thunder Bay, Michigan, computed from observations on the wet and dry bulb thermometers, made from February 1, 1860, *to June* 30, 1861.

Hour.	January. 8 days.	February. 13 days.	March. 16 days.	April. 12 days.	May. 12 days.	June. 12 days.	July. 4 days.	August. 4 days.	September. 4 days.	October. 4 days.	November. 4 days.	December. 4 days.	Total.
1 a. m.	.883	.844	.812	.801	.838	.855	.828	.910	.864	.851	.842	.819	.845
2 a. m.	.873	.834	.805	.804	.847	.868	.788	.908	.866	.850	.813	.873	.844
3 a. m.	.889	.835	.803	.802	.861	.866	.783	.917	.872	.848	.832	.850	.846
4 a. m.	.898	.828	.802	.800	848	.859	.755	.923	.868	.857	.819	.833	.841
5 a. m.	.900	.831	.809	.806	.842	.847	.745	.916	.867	.877	.830	.814	.840
6 a. m.	.886	.843	.807	.804	.827	.824	.728	.918	.900	.855	.844	.821	.838
7 a. m.	.885	.811	.797	.764	.796	.808	.803	.890	.852	.849	.817	.763	.819
8 a. m.	.883	.822	.781	.717	.769	.792	.777	.842	.847	.880	.827	.802	.811
9 a. m.	.869	.813	.761	.735	.739	.774	.759	.802	.800	.818	.822	.806	.791
10 a. m.	.853	.798	.742	.721	.721	.750	.739	.781	.785	.774	.804	.777	.770
11 a. m.	.844	.764	.727	.717	.709	.755	.709	.766	.748	.745	.787	.765	.753
12 a. m.	.862	.759	.695	.689	.673	.735	.731	.760	.719	.761	.767	.737	.741
1 p. m.	.816	.769	.700	.694	.666	.732	.723	.758	.673	.747	.765	.711	.729
2 p. m.	.828	.795	.674	.690	.679	.701	.717	.766	.683	.772	.771	.715	.732
3 p. m.	.820	.789	.683	.676	.664	.703	.732	.759	.659	.766	.765	.749	.730
4 p. m.	.859	.788	.699	.687	.676	.685	.774	.752	.683	.778	.788	.737	.742
5 p. m.	.821	.815	.697	.703	.692	.645	.744	.780	.666	.773	.779	.749	.739
6 p. m.	.781	.810	.726	.726	.677	.666	.759	.794	.698	.784	.780	.881	.757
7 p. m.	.830	.848	.744	.736	.702	.725	.780	.838	.764	.804	.821	.772	.780
8 p. m.	.828	.859	.762	.782	.729	.769	.804	.858	.751	.809	.832	.769	.796
9 p. m.	.848	.873	.777	.802	.765	.809	.834	.895	.768	.821	.805	.778	.815
10 p. m.	.869	.868	.780	.814	.772	.817	.836	.889	.790	.837	.827	.798	.825
11 p. m.	.871	.753	.811	.791	.774	.832	.841	.874	.769	.840	.820	.811	.824
12 p. m.	.880	.858	.804	.822	.791	.842	.847	.875	.841	.830	.810	.816	.834

TABLE 5.

Mean amount of diurnal variation of cloudiness of the sky at Thunder Bay, Michigan, computed from observations made from February 1, 1860, *to June* 30, 1861.

Hour.	January. 8 days.	February. 13 days.	March. 16 days.	April. 12 days.	May. 12 days.	June. 12 days.	July. 4 days.	August. 4 days.	September. 4 days.	October. 4 days.	November. 4 days.	December. 4 days.	Total.
1 a. m.	.900	.784	.562	.591	.716	.475	.725	.500	.550	.750	.800	.900	.687
2 a. m.	.887	.754	.562	.650	.725	.458	.650	.400	.500	.750	.775	1.000	.676
3 a. m.	.937	.684	.525	.575	.666	.508	.750	.500	.375	.750	.825	1.000	.674
4 a. m.	.975	.854	.462	.658	.683	.533	.775	.500	.375	.750	.850	.800	.684
5 a. m.	.925	.869	.550	.808	.700	.466	.725	.500	.475	.750	.750	.775	.683
6 a. m.	.850	.923	.594	.783	.583	.466	.550	.500	.525	.750	.775	.775	.673
7 a. m.	.887	.877	.675	.808	.566	.516	.500	.500	.400	.825	1.000	.825	.689
8 a. m.	.950	.877	.675	.833	.533	.541	.500	.500	.450	.725	1.000	1.000	.723
9 a. m.	.925	.846	.719	.800	.533	.458	.525	.375	.450	.625	.950	.750	.671
10 a. m.	.975	.854	.712	.709	.550	.483	.600	.625	.425	.675	1.000	.725	.694
11 a. m.	.912	.861	.687	.733	.550	.433	.500	.650	.400	.850	1.000	.775	.696
12 a. m.	.950	.907	.681	.691	.508	.425	.450	.600	.500	.725	1.000	.800	.686
1 p. m.	.837	.892	.650	.741	.508	.450	.375	.625	.550	.950	1.000	.775	.696
2 p. m.	.837	.892	.637	.725	.475	.416	.350	.525	.625	.800	1.000	.825	.675
3 p. m.	.812	.869	.681	.641	.466	.450	.550	.475	.475	.800	.950	.875	.670
4 p. m.	.887	.915	.706	.700	.441	.575	.525	.525	.500	.825	1.000	.900	.708
5 p. m.	.862	.931	.737	.716	.441	.475	.400	.675	.575	.725	1.000	.850	.699
6 p. m.	.787	.907	.787	.658	.416	.525	.375	.700	.650	.675	1.000	.775	.688
7 p. m.	.937	.846	.693	.691	.316	.533	.325	.550	.525	.675	1.000	.775	.655
8 p. m.	.975	.769	.656	.500	.350	.583	.325	.425	.450	.450	.900	.775	.596
9 p. m.	.900	.769	.643	.566	.208	.459	.275	.350	.175	.350	.900	.775	.531
10 p. m.	.875	.761	.633	.558	.216	.300	.175	.225	.275	.450	.950	1.000	.535
11 p. m.	.812	.769	.569	.558	.125	.283	.175	.325	.250	.400	.875	.950	.508
12 p. m.	.700	.754	.581	.575	.208	.350	.225	.425	.325	.325	.775	1.000	.520

TABLE 6.

Mean diurnal variation of the force of the winds at Thunder Bay, Michigan, computed from observations made from February 1, 1860, *to June* 30, 1861.

Hour.	January. 8 days.	February. 13 days.	March. 16 days.	April. 12 days.	May. 12 days.	June. 12 days.	July. 4 days.	August. 4 days.	September. 4 days.	October. 4 days.	November. 4 days.	December. 4 days.	Mean.
1 a. m.	34.8	16.0	16.6	23.7	14.6	8.8	29.2	4.5	32.5	24.2	12.7	31.0	19.1
2 a. m.	32.0	15.5	20.0	23.4	10 9	9.1	29.2	5.0	33.5	28.0	18.5	27.2	18.4
3 a. m.	33.7	16.5	22.1	22.3	10.6	9.2	26.0	5.0	31.7	27.7	21.0	31.0	19.1
4 a. m.	33.1	12.3	24.8	23.0	13.7	13.7	29.2	2.0	31.0	27.7	18.5	25.2	20.1
5 a. m.	33.1	12.5	24.1	23.3	14.6	17.7	31.7	5.5	33.0	25.2	24.7	24.7	20.9
6 a. m.	30.6	15.2	21.1	25.3	13.1	15.8	35.0	6.0	33.0	28.5	25.2	33.7	20.2
7 a. m.	31.6	14.7	21.0	27.3	15.7	16.3	37.5	7.0	33.0	28.5	29.0	30.0	21.1
8 a. m.	28.5	16.1	24.3	30.8	19.4	17.6	37.5	6.0	30.5	29.0	32.2	30.5	22.8
9 a. m.	27.9	16.5	24.2	31.1	22.0	22.2	37.5	11.7	36.2	31.0	36.7	40.0	23.9
10 a. m.	24.1	15.8	24.9	33.5	22.4	20.0	35.0	8.0	26.7	31.0	37.2	40.0	23.4
11 a. m.	21.7	14.9	22.2	34.4	18.7	19.4	32.5	15.2	23.5	24.7	37.2	33.2	21.9
12 a. m.	21.5	12.5	23.7	31.3	17.4	17.2	29.2	18.5	21.0	16.2	39.7	30.0	20.6
1 p. m.	17.6	14.3	22.7	31.6	16.4	17.5	33.0	18.5	28.7	16.2	39.7	18.5	20.0
2 p. m.	21.5	11.4	26.4	25.9	16.1	17.3	30.5	21.7	29.2	18.2	34.0	25.2	19.7
3 p. m.	21.2	12.0	28.0	26.1	18.1	15.9	25.2	18.5	27.5	14.6	35.2	19.5	20.2
4 p. m.	21.5	16.4	30.8	30.1	15.0	17.1	23.5	23.5	17.7	24.0	34.0	18.0	21.8
5 p. m.	21.2	20.2	28.8	31.3	14.6	13.7	21.5	26.7	17.7	24.0	33.5	15.7	21.6
6 p. m.	20.7	23.4	29.9	25.7	17.6	11.9	16.2	21.5	21.5	20.5	36.7	18.5	21.5
7 p. m.	23.2	20.3	29.2	22.1	12.0	15.6	15.2	23.5	15.7	24.0	36.2	21.5	20.4
8 p. m.	27.1	22.7	27.2	21.7	12.3	14.0	15.2	16.0	28.2	21.5	32.5	21.5	20.8
9 p. m.	29.2	15.5	27.6	22.7	11.3	12.7	4.0	11.2	25.7	13.0	38.7	21.0	20.3
10 p. m.	30.3	18.4	23.2	17.3	12.8	12.0	7.2	16.5	24.7	8.2	38.7	21.0	19.0
11 p. m.	26.8	15.7	22.3	15.2	15.0	13.5	4.0	14.0	27.7	7.0	36.2	21.0	18.1
12 p. m.	23.0	14.3	22.6	17.2	16.2	11.9	11.7	13.5	29.2	7.5	38.7	12.7	17.5

NOTE.—The mean is for the first six months.

TABLE 7.

Mean diurnal variation of the direction and force of the winds at Thunder Bay, Michigan, from observations made from February 1, 1860, *to June* 30, 1861.

Hour.	NORTH.		NORTHEAST.		EAST.		SOUTHEAST.		SOUTH.		SOUTHWEST.		WEST.		NORTHWEST.		No. of calms.
	No. of ob-serv's.	Estimated force.	No. of ob-serv's.	Estimated force.	No of ob-serv's.	Estimated force.	No. of ob-serv's.	Estimated force.	No. of ob-serv's.	Estimated force.	No. of ob-serv's.	Estimated force.	No. of ob-serv's.	Estimated force.	No. of ob-serv's.	Estimated force.	
1 a. m.	16	438	8	161	3	59	8	167	13	381	9	98	6	106	9	431	15
2 a. m.	14	470	9	254	4	53	12	189	14	287	7	87	7	119	20	440	6
3 a. m.	10	439	12	288	4	63	10	255	11	132	9	112	6	123	22	499	11
4 a. m.	13	476	10	274	3	73	9	253	13	146	9	123	6	102	21	490	11
5 a. m.	11	476	15	348	2	85	8	105	11	171	12	195	5	90	21	443	10
6 a. m.	13	530	10	286	6	208	6	105	12	299	12	197	5	80	23	436	8
7 a. m.	19	597	6	195	5	216	13	307	12	151	9	153	5	72	22	475	4
8 a. m.	18	630	5	185	5	232	16	365	9	101	10	197	4	57	22	481	7
9 a. m.	18	637	8	259	5	245	17	389	10	157	11	208	7	98	17	465	2
10 a. m.	19	669	9	225	6	257	16	278	11	249	15	233	3	66	14	396	3
11 a. m.	19	643	9	203	7	272	18	277	11	248	13	249	2	26	13	351	3
12 a. m.	17	519	9	182	9	255	13	147	14	277	12	242	3	63	15	396	4
1 p. m.	14	448	10	203	8	238	15	185	13	263	9	95	6	177	16	497	7
2 p. m.	15	450	9	178	7	230	16	212	12	236	8	141	6	173	14	499	9
3 p. m.	13	499	6	81	7	216	17	229	12	182	10	157	5	164	15	496	6
4 p. m.	18	546	7	119	6	199	20	296	10	135	13	229	5	216	14	342	2
5 p. m.	18	458	6	148	5	148	20	357	10	148	9	204	8	208	14	467	5
6 p. m.	20	447	5	149	6	166	17	262	9	232	8	151	10	289	12	420	8
7 p. m.	19	368	7	183	4	94	13	295	15	161	8	190	9	238	10	485	11
8 p. m.	21	428	6	196	3	53	13	295	15	184	6	182	7	257	11	449	13
9 p. m.	15	339	6	184	2	72	13	221	16	184	7	208	8	263	13	376	12
10 p. m.	15	324	8	187	3	84	13	207	13	158	10	233	7	268	9	318	16
11 p. m.	17	338	10	133	1	25	13	227	13	147	9	224	10	273	12	288	9
12 p. m.	16	257	10	168	3	74	10	196	9	130	9	217	11	242	16	397	11

LAKE SUPERIOR.

METEOROLOGICAL OBSERVATIONS.

Approximate height of lake above the level of the sea, 600 feet.

Location of stations and names of observers.

Superior City, Wisconsin.—Lat., 46° 46′ 30″ N.; Long., 92° 03′ 28″ W.; height above the lake, 40 feet. Observer, E. H. Bly.

Ontonagon, Michigan.—Lat., 46° 52′ 30″ N.; Long., 89° 30′ 30″ W.; height above the lake, 10 feet. Observer, H. Selby.

Marquette, Michigan.—Lat., 46° 32′ 40″ N.; Long., 87° 33′ 30″ W.; height above the lake, 34 feet. Observer, Frank M. Bacon.

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.533	29.451	29 476	29.434	58	76	59	60	78	61	66.3	80	55	.456	.870	.473	.599
2	29.577	29.188	29.011	29.258	61	60	58	64	64	60	62.7	66	50	.497	.465	.456	.473
3	28.863	28.855	28.980	28.898	62	67	61	63	72	65	66.7	75	58	.542	.595	.483	.540
4	29.138	29.161	29.258	29.185	58	63	65	58	68	59	61.7	70	55	.482	.509	.380	.457
5	29.447	29.388	29.415	29.417	50	70	57	51	74	63	62.7	75	45	.348	.679	.386	.471
6	29.469	29.271	29 186	29.308	56	55	56	57	56	56	56.3	65	48	.436	.420	.449	.435
7	29.038	29.145	29.167	29.118	67	70	67	67	73	68	69.3	75	54	.662	.693	.648	.667
8	29.088	29 083	29.130	29.100	58	61	59	59	62	60	60 3	69	56	.469	.523	.487	.493
9	29.194	29.197	29.167	29 185	....	67	61	60	72	63	65.0	74	56	....	.595	.510	.552
10	29.171	29.054	28.964	29.065	67	74	69	68	85	75	76.0	85	59	648	.691	.655	.664
11	29.102	29.268	29.318	29.228	60	65	56	63	74	61	66.0	75	60	.478	.497	.383	.452
12	29.514	29.433	29.433	29 463	58	65	58	63	73	60	65.3	79	49	.416	.510	.456	.460
13	29.331	29.278	29.321	29.310	59	63	58	61	65	60	63.0	72	50	.473	.549	.456	.492
14	29.504	20.438	29.474	29.471	56	65	55	57	72	58	62.3	73	53	.436	.524	393	.451
15	29.614	29.531	29.511	29.541	50	65	55	51	70	59	60.0	74	45	.348	.550	.380	.426
16	29.424	29.322	29.313	29.354	59	66	63	60	81	68	69.7	81	55	.487	.438	.509	.478
17	29.326	29.365	29.438	29.376	65	70	60	67	80	63	70.0	81	60	.591	.598	.478	.555
18	29.544	29.421	29.361	29.441	58	60	55	60	85	58	67.7	65	51	.456	.451	.393	.433
19	29.231	29.363	29.298	29.298	60	69	62	64	73	65	67.3	75	55	465	.655	.516	.545
20	29.459	29.433	29.418	29.437	55	60	60	59	65	61	61.7	66	56	380	.451	.505	.445
21	29.322	29.194	29.179	29.231	56	56	57	58	56	57	57.0	62	52	.422	.449	.466	.465
22	29.162	29.148	29.245	29.185	53	70	59	57	75	65	65.7	79	47	.350	.666	.420	.478
23	29.477	29.592	29.552	29.540	55	....	52	58	58	55	57.0	66	53	.393	....	.349	.371
24	29.387	29.274	29 204	29.289	52	59	52	54	61	59	58.0	66	52	362	.473	.322	.385
25	29.162	29.135	29.147	29.139	58	65	....	59	68	63	63.3	76	54	.469	.577	....	.523
26	29.186	29.112	29 201	29.165	62	68	60	63	78	62	67.7	80	60	.542	.550	.491	.527
27	29.318	29.290	29.298	29.300	60	70	65	62	80	67	69.7	89	58	.491	.598	.591	.560
28	29.316	29 300	29.365	29.327	62	70	63	63	82	69	71.3	86	56	.542	.572	.495	.536
29	29.551	29.536	29.503	29.530	67	56	56	69	60	57	62.0	70	56	.635	.436	.436	.502
30	29.462	29.355	29.298	29.371	50	69	65	51	78	66	65.0	79	46	.348	.586	.604	.513
31	29.053	28 938	29.017	29.000	64	71	62	65	80	64	69.7	81	58	.583	.637	.529	.583
Means.....	29.321	29.275	29.276	29.291	58.5	65.5	59.5	60.3	71.5	62.2	64.7	....	....	.473	.560	.470	.501
Sept. 1	29.267	29.324	29.357	29.316	50	53	48	51	54	50	51.7	65	50	.348	.389	.309	.348
2	29.388	29.254	29.155	29.265	39	57	56	41	60	60	53.7	70	36	.212	.426	.396	.344
3	29.053	28.913	28.873	28.946	54	64	58	55	65	60	60.0	66	54	.404	.583	.456	.481
4	29 020	29.092	29.213	29.108	65	67	58	72	83	63	72.7	83	58	.524	.447	.416	.462
5	29.377	29.432	29.467	29.425	54	53	50	55	55	53	54.3	69	52	.404	.376	.321	.367
6	29.392	29.252	29 225	29.289	50	52	52	51	53	53	52.3	55	50	.348	.375	.375	.366
7	29.041	29.073	29.174	29.096	57	60	54	58	71	59	62.7	71	48	.452	.371	.351	.391
8	29.377	29.398	29.438	29.404	50	60	52	52	74	56	60.7	74	50	.334	.331	.355	.340
9	29.372	29.204	29.270	29.282	45	65	62	47	80	67	64.7	81	40	.273	.417	.489	.393
10	29.241	29.187	29.221	29.213	60	61	50	64	64	52	60.0	68	50	.465	.497	.334	.432
11	29 197	29.307	29.475	29.326	50	48	42	51	49	43	47.7	53	40	.348	.296	.254	.299
12	29.662	29.731	29 695	29.696	40	47	38	42	50	38	43.3	51	35	.221	.283	.229	.244
13	29.605	29.464	29.412	29.493	44	50	48	45	52	49	48.7	53	40	.275	.334	.322	.310
14	29.374	29.486	29.577	29.479	50	58	53	55	60	55	56.7	60	45	.295	.456	.376	.376
15	29.734	29.690	29.641	29.688	50	53	48	51	58	50	53.0	59	50	.348	.336	.305	.327
16	29.443	29.229	29.204	29.292	50	50	50	51	51	50	50.7	53	45	.348	318	.361	.352
17	29.102	29.051	29.088	29.080	54	57	48	54	58	50	54.0	62	50	.418	.452	.309	.393
18	29.272	29.354	29.437	29.354	50	57	47	51	65	48	54.7	65	46	.348	.359	.310	.339
19	29.521	29.367	29.335	29.407	40	53	51	42	54	52	49.3	56	38	.221	.389	.361	.323
20	29.375	29.394	29.377	29.382	50	57	56	51	61	57	56.3	62	45	.348	.412	.436	.398
21	29.046	29.996	29.043	29 028	55	57	59	56	59	56	57.0	62	52	.420	.439	.282	.380
22	29.242	29.264	29.254	29.253	50	63	59	52	66	60	59.3	68	47	.334	536	487	.452
23	29.424	29.452	29.497	29.457	50	52	41	51	61	44	52.0	63	45	.348	.269	.218	.278
24	29.463	29.254	20.254	29.323	44	65	50	45	71	57	57.3	71	39	.275	.537	.268	.360
25	29.088	29.048	29.087	29.074	47	60	51	52	74	55	60.3	75	50	.257	.311	.321	.303
26	29.061	29.098	29.105	29.088	58	65	58	60	72	60	64.0	80	45	.456	.521	.436	.478
27	29.101	28.928	28.935	28.988	56	60	58	58	64	61	61.0	77	51	.422	.465	.443	.443
28	29.310	29.362	29.438	29.370	46	58	47	47	62	48	52.3	62	46	.297	429	.310	.342
29	29.518	29.440	29.430	29.462	45	47	40	48	48	42	46.0	50	40	.260	.310	.221	.263
30	29.423	29.360	29.347	29.376	45	48	49	46	50	51	49.0	56	41	.286	.309	.321	.305
Means.....	29.316	29.280	29.301	29.299	49.9	56.6	50.8	51.8	61.5	53.3	55.5	....	....	.343	.401	.345	.363

of the north and northwestern lakes, at Superior, Wisconsin.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1,000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.880	.908	.882	.890	W......	SW...	SW...	2.0	0.3	2.4	1.4	S. 64 W.	0	4	0	.180	.40
.883	.780	.880	.848	SW......	NE....	NE....	0.3	4.0	2.4	2.1	N. 45 E..	0	6	10	.119	....
.942	.758	.783	.827	S........	SW...	W.....	0.3	1.2	0.3	0.5	S. 45 W.	10	4	7	.121	.12
1.000	.743	.761	.834	W......	NW...	N.NW.	0.3	3.6	4.8	2.8	N. 34 W.	8	5	3	.050	....
.929	.810	.670	.803	W......	S.......	SW...	0.3	0.3	0.3	0.2	S. 45 W.	3	1	0	.250	....
.936	.935	1.000	.957	NE......	NE....	NE....	2.4	8.4	10.0	6.9	N. 45 E..	7	8	4	.020	....
1.000	.854	.947	.933	SW......	NW...	SW...	0.3	0.3	0.3	0.2	S. 71 W.	6	10	6	.082	....
.939	.942	.940	.940	E.......	E......	E......	0.3	3.6	0.3	1.4	East.....	10	10	10	.018	.62
......	.758	.886	.822	W......	NE....	NE....	0.6	2.4	0.3	0.7	N. 35 E..	0	3	0	.137	.05
.947	.574	.807	.776	SE......	S......	S......	0.6	3.6	1.2	1.7	S. 5 E..	5	3	10	.124	.41
.831	.593	.713	.712	NW......	W.....	W......	2.4	4.8	0.3	2.3	N. 76 W.	3	4	0	.129	.10
.723	.629	.880	.744	E.......	SE....	NE....	0.6	2.4	0.3	1.0	S. 59 E..	0	0	0	.196	.21
.882	.890	.880	.884	SW......	N......	NE....	0.3	0.6	0.3	0.2	North...	10	7	10	......	.014
.936	.668	.816	.806	NW......	NW...	W...	1.2	3.0	1.2	1.7	N. 55 W.	3	0	0	.185	.10
.929	.751	.761	.813	NW......	E......	NE....	0.3	0.6	0.3	0.2	N. 56 E..	7	3	10	.148	....
.940	.415	.743	.699	NE......	SW...	SW....	0.3	8.4	4.8	4.3	S. 45 W.	0	3	0	.204	....
.893	.585	.831	.769	NW......	NW...	SW....	2.7	3.6	0.3	2.1	N. 48 W.	7	3	0	.188	....
.880	.731	.816	.809	NE......	NE....	NE....	1.2	0.6	0.3	0.7	N. 45 E..	0	3	0	.102	....
.780	.807	.836	.807	SW......	NE....	NE....	2.4	0.3	0.3	0.7	S. 45 W.	3	8	4	.050	....
.761	.731	.941	.811	N........	NE....	NE....	1.2	0.6	0.3	0.6	N. 20 E..	0	3	0	.129	05
.876	1.000	1.000	.958	NE......	NE....	NE....	2.4	3.6	2.4	2.8	N. 45 E..	10	10	10	.000	....
.752	.768	.680	.733	SW......	SW....	NW...	4.8	5.0	0.3	3.3	[illegible] 47 W.	0	5	0	.115	.50
.816	......	.805	.810	NE......	NE....	NE....	5.7	6.8	4.4	5.6	N. 45 E..	0	0	0	.170	....
.867	.812	692	.790	NE......	E......	NE....	1.2	2.4	2.0	1.7	N. 64 E..	7	6	7	.035	....
.939	.843	......	.891	N........	NE....	SW...	0.3	0.6	3.6	0.9	S. 49 W.	10	5	0	.055	....
.942	.574	.884	.800	SW....	SW....	NW...	3.6	5.4	1.2	3.0	S. 52 W.	0	7	3	.115	....
.884	.585	.893	.787	SW....	NE....	W.....	1.2	0.6	0.3	0.2	S. 60 W.	0	3	0	.170	....
.942	.524	.700	.722	SW......	NE....	NE....	3.4	4.0	2.4	0.7	N. 45 E..	0	2	6	.160	....
.896	.936	.936	.922	NE......	NE....	NE.....	4.8	5.4	4.0	4.7	N 45 E..	0	3	0	.128	....
.929	.613	.945	.829	E.......	S......	NW...	0.3	3.6	1.2	0.9	S. 11 W.	0	5	0	......	....
.944	.623	.888	.818	S........	NW...	NW...	0.3	3.6	0.3	1.2	N. 48 W..	10	5	8	......	....
.893	.738	.840	.824	....	....	....	....	...	...	0.4	N. 12 E,.	3.8	4.5	3.4	3.394	2.56
.929	.933	.856	.906	N........	E......	NE....	4.8	5.4	0.3	2.5	N. 48 E..	8	7	0	.115	....
.824	.822	.765	.803	S........	NE....	NE....	0.3	1.2	0.3	0.4	N. 55 E..	0	0	0	.075	....
.934	.944	.880	.919	E........	E......	N.NW.	0.3	2.0	0.3	0.7	N. 84 E..	3	1	0	.099	...
.668	.396	.723	.595	SE......	SE....	NW...	3.6	3.0	0.3	2.1	S. 45 E..	4	3	10	.235	...
.935	.869	.798	.867	NE......	NE....	NE....	4.8	10.0	13.0	9.3	N. 45 E..	7	6	9	.088	....
.929	.932	.932	.931	E........	NE....	NE....	3.0	4.8	0.3	2.5	N. 61 E..	10	10	10	.000	....
.937	.490	.703	.710	SW......	W.....	SW....	1.2	4.8	3.6	2.9	S. 68 W..	10	3	0	.052	.04
.861	.395	.747	.667	NW......	SW...	SW....	2.4	3.0	0.3	1.3	S. 81 W..	0	0	0	.106	...
.847	.407	.740	.664	SW......	S.....	S.......	0.3	4.8	0.3	1.7	S. 2 W..	0	0	0	.115	....
.780	.833	.861	.824	S........	N......	NE....	2.4	2.4	3.6	1.2	N. 45 E..	3	5	10	.185	....
.929	.790	.916	.878	NE......	N......	NE....	3.6	1.2	4.8	3.1	N. 40 E..	10	10	2	.....	1.90
.829	.786	1.000	.871	NE......	N......	NE....	0.3	2.4	6.0	2.9	N 45 E..	0	0	6	.020	.57
.920	.861	.926	.902	S........	SE....	E.....	0.3	2.4	0.3	0.7	S. 45 E..	10	10	10	.....	.04
.681	.880	.869	.810	E........	NW...	NW...	0.3	1.2	0.3	0.4	N. 35 W.	10	10	0	.....	.59
.929	.698	.856	.827	N.NW...	NE....	NE....	3.6	2.4	0.3	1.7	N. 7 E..	3	2	7	....	.10
.929	.929	1.000	.986	E........	NE....	NE....	4.8	5.9	9.6	6.3	N. 55 E..	10	10	10	......	...
1.000	.937	.856	.931	NE......	SW....	SW...	0.3	2.4	1.2	1.1	S. 45 W.	10	10	0	.....	1.56
.929	.582	.925	.812	SW......	NW...	NW...	1.2	2.4	0.3	1.0	N. 67 W.	6	3	0	......	.06
.829	.933	.930	.897	NW......	NE....	NE....	0.3	4.8	0.3	1.7	N. 42 E..	3	10	10	.062	....
.929	.769	.936	.878	N........	NE....	NE ...	0.6	2.4	3.6	2.1	N. 41 E..	3	2	7	.088	.06
.935	.878	.627	.813	N........	N......	SE....	3.6	0.3	3.6	0.9	N. 60 E..	10	10	0	.030	....
.861	.838	.940	.879	NW......	NE....	N......	0.4	0.6	0.3	0.3	N. 6 E..	3	0	10	.095	.04
.929	.502	.756	.729	N........	NW...	NW...	5.4	1.0	2.4	2.7	N. 17 W.	10	0	0	.000	....
.920	.708	.577	.735	SW......	SE....	SE....	4.2	7.2	4.8	3.8	S. 7 W.	0	0	3	.100	....
.660	.395	.743	.599	SE......	SE....	SE....	2.4	5.4	0.3	2.7	S. 45 E..	2	0	0	.305	....
.880	.668	.880	.776	SW......	NE..	SW...	6.0	2.4	0.3	1.3	S. 45 W.	0	0	0	.105	....
.876	.780	.825	.827	SE......	N......	NE....	0.3	2.4	0.3	0.8	N. 10 E..	0	0	5	.115	...
.923	.772	.925	.873	NW......	NW...	NW...	0.3	4.8	5.4	3.5	N. 45 W.	6	3	3	.065	....
.777	.925	.829	.843	E........	E......	NE....	5.4	6.8	2.4	4.7	N. 83 E..	7	10	10	.140	....
.921	.856	.859	.879	E........	E......	E.....	4.8	2.4	3.2	3.5	East.....	10	10	10	.070	.17
.876	.750	.839	.822	....	....	....	....	..	..	1.1	N. 56 E..	5.3	4.5	4.4	2.260	5.13

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
October 1	29.247	29.088	29.056	29.130	52	55	54	54	56	56	55.3	57	50	.362	.420	.391	.391
2	29.335	29.299	29.310	29.314	45	56	50	47	66	57	56.7	68	45	.273	.316	.268	.285
3	29.174	28.879	28.888	28.980	51	52	53	52	52	60	53.0	60	50	.361	.388	.376	.375
4	29.224	29.507	29.567	29.372	44	48	40	48	54	42	48.0	60	42	.236	.256	.221	.237
5	29.556	29.510	29.210	29.428	39	55	50	40	66	57	54.3	66	28	.225	.287	.268	.860
6	28.886	28.847	28.928	28.885	52	59	50	53	61	52	55.3	66	52	.375	.473	.334	.394
7	28.862	28.739	28.718	28.773	39	51	50	40	52	52	48.0	54	38	.225	.361	.334	.306
8	28.859	29.071	29.247	29.059	48	47	39	49	51	41	47.0	54	40	.322	.270	.212	.268
9	29.344	29.397	29.585	29.442	36	48	40	37	56	42	45.0	57	32	.199	.230	.221	.216
10	29.711	29.651	29.643	29.668	33	43	31	34	51	33	39.3	52	29	.175	.173	.151	.166
11	29.562	29.380	29.323	29.422	30	55	35	32	55	36	41.0	57	26	.144	.433	.191	.256
12	29.077	28.963	29.048	29.263	38	53	48	40	67	52	56.0	68	32	.130	.217	.282	.809
13	29.358	29.398	29.610	29.455	44	43	35	44	51	37	44.0	55	35	.288	.173	.178	.213
14	29.692	29.632	29.642	29.656	28	35	23	31	40	24	31.7	42	23	.119	.139	.112	.123
15	29.452	29.032	29.069	29.185	28	38	36	29	42	38	36.3	44	18	.142	.177	.186	.168
16	29.177	29.306	29.403	29.295	38	47	37	40	53	41	44.7	54	35	.203	.244	.168	.205
17	29.447	29.248	29.168	29.284	30	46	38	31	53	39	41.0	54	24	.155	.219	.216	.196
18	29.009	29.262	29.353	29.808	43	45	40	44	57	44	48.3	59	34	.264	.142	.195	.200
19	29.682	29.556	29.488	29.575	33	41	34	35	45	36	38.7	57	33	.162	.205	.170	.179
20	28.965	28.671	28.728	28.788	36	46	44	41	55	49	48.3	56	28	.147	.192	.223	.187
21	28.909	28.969	29.182	29.020	41	43	36	43	48	39	43.3	52	28	.231	.212	.173	.205
22	29.444	29.504	29.544	29.497	30	36	31	32	42	34	36.0	45	31	.144	.134	.139	.139
23	29.444	29.147	29.104	29.231	30	36	34	32	40	36	36.0	41	28	.144	.160	.170	.158
24	29.440	29.616	29.847	29.634	26	26	23	27	28	24	26.3	37	23	.129	.117	.112	.119
25	30.026	29.841	29.684	29.850	21	32	24	23	36	26	28.3	38	20	.090	.129	.106	.108
26	29.270	29.239	29.238	29.232	27	37	31	30	47	36	37.7	49	25	.113	.090	.116	.106
27	29.117	29.146	29.118	20.127	38	36	36	34	37	37	36.0	38	24	.155	.199	.199	.184
28	29.152	29.198	29.318	29.230	33	42	33	34	43	35	37.3	45	32	.175	.254	.162	.197
29	29.370	29.201	29.102	29.214	23	38	41	24	41	44	36.3	45	22	.112	.190	.218	.173
30	29.040	29.078	29.099	29.075	42	54	41	43	60	43	48.7	60	37	.254	.331	.231	.273
31	29.075	29.230	29.358	29.221	40	42	35	41	43	37	40.3	56	36	.235	.254	.177	.222
Means...	29.287	29.246	29.277	29.270	36.5	44.6	38.4	38.2	49.9	41.1	43.1	....	...	.202	.238	.209	.216
Nov. 1	29.375	29.462	29.484	29.440	29	32	27	30	33	28	30.3	35	27	.149	.168	.136	.151
2	29.318	29.167	29.150	29.211	24	32	29	25	34	31	30.0	35	22	.117	.155	.137	.136
3	29.445	29.386	29.284	29.371	30	34	34	31	37	37	35.0	39	29	.115	.157	.157	.123
4	29.117	29.264	29.464	29.281	29	37	33	31	39	35	35.0	43	30	.137	.194	.162	.164
5	29.620	29.462	29.454	29.512	28	33	25	32	41	28	33.7	42	28	.108	.084	.100	.097
6	29.035	29.161	29.410	29.202	29	34	33	31	37	35	34.3	40	26	.137	.157	.162	.152
7	29.590	29.460	29.438	29.496	27	40	28	28	47	32	35.7	49	25	.136	.156	.108	.133
8	29.400	29.358	29.443	29.400	27	43	26	30	52	28	36.7	53	28	.113	.160	.117	.130
9	29.690	29.641	29.636	29.655	25	42	35	27	44	37	36.0	45	20	.112	.241	.178	.177
10	29.590	29.261	29.126	29.325	31	35	34	33	37	35	35.0	41	31	.151	.178	.183	.170
11	29.067	29.145	29.332	29.181	27	25	20	29	29	21	26.3	39	20	.124	.089	.096	.103
12	29.384	29.266	29.430	29.360	15	28	20	16	31	22	23.0	31	14	.074	.119	.085	.092
13	29.517	29.186	20.463	20.488	8	14	8	9	15	9	11.0	26	7	.051	.071	.051	.057
14	29.903	29.936	29.967	29.935	2	18	—3	3	20	—2	7.0	22	—2	.036	.076	.026	.046
15	30.004	29.811	29.848	29.887	5	20	22	6	22	23	17.0	26	—3	.043	.085	.107	.078
16	29.741	29.682	29.677	29.700	26	32	22	27	35	23	28.3	38	22	.129	.142	.107	.126
17	29.686	39.690	29.677	29.686	17	33	20	18	37	21	25.3	37	15	.083	.136	.096	.105
18	29.480	29.326	29.361	26.395	31	35	30	32	37	31	33.3	37	19	.162	.178	.155	.165
19	29.480	29.374	29.431	29.428	20	32	23	22	35	24	27.0	37	21	.085	.142	.112	.113
20	29.340	29.406	29.392	29.379	26	31	21	28	32	22	27.3	38	21	.117	.162	.101	.126
21	29.393	29.171	29.268	29.277	22	45	32	23	53	36	37.3	54	18	.107	.194	.129	.140
22	29.607	29.651	29.685	29.647	28	33	25	29	39	26	31.3	40	25	.142	.110	.124	.125
23	29.584	29.282	29.169	29.347	14	36	33	15	44	34	31.0	45	9	.071	.108	.175	.118
24	29.010	29.079	29.258	29.115	30	31	23	32	32	24	29.3	36	21	.144	.162	.112	.139
25	29.437	29.425	29.438	29.433	11	28	12	12	32	13	19.0	33	11	.061	.108	.063	.077
26	29.278	29.063	29.002	29.114	9	26	24	10	29	25	21.3	31	8	.054	.106	.117	.092
27	29.058	29.088	29.071	29.079	28	24	14	29	26	15	23.3	37	14	.142	.106	.071	.106
28	28.829	28.885	28.923	28.879	16	23	21	17	24	22	21.0	28	11	.083	.112	.101	.098
29	29.051	29.025	29.075	29.050	17	26	22	18	27	23	22.7	31	12	.087	.129	.107	.107
30	20.251	29.355	29.514	29.373	21	22	12	22	23	13	19.3	26	12	.101	.107	.063	.090
Means....	29.409	29.358	29.396	29.388	21.7	30.8	23.5	23.2	34.0	25.0	27.4	....	...	.106	.136	.114	.117

of the north and northwestern lakes, at Superior, Wisconsin.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.867	.935	.872	.891	E.	E.	SW.	1.2	3.2	0.3	1.4	S. 87 E.	10	10	10	.025	....
.847	.495	.577	.639	SW.	SW.	N.	2.4	0.6	5.4	1.3	N. 33 W.	0	10	8	.055	.04
.930	1.000	.869	.933	NE.	NE.	W.	3.0	1.2	8.0	1.9	N. 60 W.	10	10	10	.010	.18
.704	.613	.829	.715	W.	NW.	W.	7.2	3.0	1.2	3.6	N. 79 W.	7	5	0	.025	.02
.910	.450	.577	.645	SW.	NE.	SW.	1.0	5.0	3.6	2.2	S. 3 E.	3	4	10	.000	....
.922	.822	.861	.892	NE.	NW.	SW.	2.4	1.8	0.3	0.9	N. 6 E.	10	0	0	.038	.10
.910	.930	.861	.900	NW.	E.	NE.	0.3	2.4	1.2	1.1	N. 71 E.	10	10	10	......	.08
.926	.722	.824	.824	NW.	NW.	SW.	3.6	1.5	0.3	1.7	N. 48 W.	10	5	5	.020	1.30
.903	.512	.829	.748	SW.	SW.	NW.	0.3	2.4	5.4	2.0	N. 71 W.	3	4	7	.070	.04
.895	.461	.800	.718	NW.	NW.	SW.	0.6	2.0	2.4	1.2	N. 88 W.	10	4	0	.072	....
.794	1.000	.900	.898	SW.	SW.	SW.	2.4	6.9	0.3	3.2	S. 45 W.	8	0	0	.038	....
.782	.329	.727	.612	SW.	SW.	SW.	0.3	9.8	0.3	3.5	S. 45 W.	0	0	10	.130	....
1.000	.461	.807	.756	NW.	NW.	W.	3.6	1.2	6.0	3.3	N. 70 W.	10	4	0	.065	...
.685	.557	.868	.703	N NW.	E.	SW.	8.4	1.8	0.3	2.6	N. 12 W.	0	0	8	.045	....
.887	.661	.811	.786	SW.	SE.	SW.	0.6	3.6	0.3	1.2	S. 31 E.	0	10	0	.010	....
.820	.606	.653	.693	NW.	NW.	SW.	1.2	5.4	4.8	2.7	N. 81 W.	8	5	7	.044	....
.893	.544	.907	.781	SW.	S.	E.	0.3	2.4	0.3	0.8	S. 3 E.	0	6	8	.036	....
.918	.305	.677	.633	SW.	SW.	NW.	0.6	13.2	5.9	4.9	S. 68 W.	0	4	6	.114	....
.797	.684	.802	.761	NW.	E.	NE.	2.0	1.2	0.3	0.5	North	5	7	9	.011	....
.567	.445	.638	.550	SW.	SW.	SW.	3.0	2.4	1.2	2.2	S. 45 W.	6	8	8	.100	....
.833	.631	.726	.730	SW.	NW.	SW.	3.6	7.2	4.8	3.6	S. 85 W.	4	3	2	.085	....
.794	.500	.712	.668	NW.	NW.	NW.	2.4	1.2	3.6	2.4	N. 45 W.	6	4	5	.025	....
.794	.645	.802	.747	SW.	E.	NE	0.3	3.6	0.3	1.2	East	10	10	10	.015	....
.880	.768	.868	.838	NW.	NW.	NW.	6.0	7.2	2.4	5.2	N. 45 W.	7	5	10	.050	....
.730	.610	.754	.698	NW.	W	SW.	2.0	7.2	3.6	3.7	S. 84 W.	0	0	10	.060	....
.615	.276	.550	.480	SW.	SW.	SW.	3.4	3.0	3.6	3.3	S. 45 W.	0	0	10	.050	....
.798	.903	.903	.866	SW.	SE.	E.	0.3	0.6	0.3	0.2	S. 40 E.	10	10	10	.033	....
.895	.916	.797	.869	SW.	W.	SW.	0.3	1.8	0.3	0.7	S. 79 W.	9	7	2	.057	.31
.868	.738	.756	.787	SW.	NE.	NE.	0.3	1.2	2.0	1.0	N. 45 E.	0	10	10	.015	....
.916	.653	.833	.800	SW.	NW.	NE.	3.6	0.3	9.6	2.0	N. 43 E.	0	3	10	.045	.01
.918	.916	.807	.878	NE.	E.	NE.	4.8	0.6	5.6	3.6	N. 47 E.	10	10	10	.000	....
.838	.649	.780	.756	....	....	....	....	....	....	1.1	N. 82 W.	53	53	64	1.343	2.08
.890	.893	.883	.888	N.	NW.	NW.	13.2	.9	.3	4.7	N. 3 W	10	10	3	......	....
.872	.792	.788	.817	SW.	SW.	SW.	3.0	2.4	.6	2.	S. 45 W.	10	10	0	0.02	....
.893	.712	.712	.839	N.	E.	NE.	4.4	.6	.3	1.5	N. 10 E.	0	10	10	......	....
.988	.816	.797	.800	E	NW.	NW.	0.3	2.4	.6	.9	N. 40 W.	10	9	8	......	....
.594	.328	.655	.525	NW.	NW.	SW.	0.3	2.4	4.2	1.	N. 68 W.	6	3	7	......	....
.788	.712	.797	.765	SW.	NW.	NW.	2.4	3.6	7.4	3.7	N. 57 W	7	8	6	......	....
.883	.483	.594	.653	SW.	S.	SE.	3.0	2.	1.2	1.	S. 11 E.	0	0	3	......	....
.675	.411	.768	.618	S.	NW.	N.	0.3	.3	.3	.1	N. 45 W.	0	0	0	......	....
.761	.836	.807	.801	SW.	SE.	NE.	0.3	.3	2.4	.7	N. 52 E.	0	8	6	......	....
.800	.807	.898	.835	E.	E.	E.	0.3	.3	1.2	2.4	East	10	4	7	......	....
.775	.556	.855	.728	NW.	W.	W.	2.1	4.5	3.6	3.2	N. 81 W.	10	6	2	......	....
.829	.685	.721	.745	SW.	SW.	NW.	1.8	2.4	6.8	2.7	N. 76 W.	10	0	4	......	....
.784	.823	.784	.797	W.	SW.	SW.	.6	.3	.3	.3	S. 68 W.	10	10	0	......	....
.730	.702	.671	.701	W.	W.	W.	3.6	1.2	.6	1.8	West	0	0	0	......	0.12
.760	.721	.864	.782	W.	E.	E.	0.3	.6	.3	.2	East	10	10	10	......	....
.880	.698	.864	.814	E.	SW.	SW.	0.3	.6	1.2	.5	S. 37 W.	2	6	0	......	0.32
.840	.619	.855	.771	SW.	SW.	SW.	0.3	1.2	2.4	1.3	S. 45 W.	8	0	6	......	....
.896	.807	.893	.865	S.	S.	SW.	2.4	5.4	3.6	3.5	S. 14 W.	10	10	3	......	....
.721	.698	.868	.762	W.	SW.	SW.	0.3	7.5	2.4	4.1	S. 55 W.	0	0	0	......	....
.868	.896	.860	.841	N.NW.	SW.	SW.	4.8	1.0	.3	1.5	N. 38 W.	6	8	3	......	....
.864	.483	.610	.652	SW.	S.	SW.	.3	3.9	.6	2.3	S. 21 W.	0	0	0	......	....
.887	.463	.876	.742	N.	NW.	N.	3.6	2.4	3.6	.3	N. 11 W.	8	0	6	......	....
.823	.372	.895	.696	SW.	SW.	S.	2.4	6.2	.6	.3	S. 42 W.	0	3	0	......	....
.794	*.896	.868	.853	W.	W.	NE.	0.3	3.9	5.4	1.6	N. 39 W.	7	4	10	......	....
.804	.594	.810	.736	NW	NW.	SW.	0.9	0.3	2.4	.9	S. 70 W.	3	0	0	......	...
.791	.665	.872	.776	S.	S.	SW.	0.3	.3	.3	.2	S. 76 W.	7	8	0	......	....
.857	.754	.823	.821	NW.	NW.	NW.	7.5	3.6	.3	3.7	N. 45 W.	10	3	8	......	....
.840	.868	.860	.856	SW.	E.	E.	0.3	.1	.3	.3	S. 80 E.	10	10	10	......	....
.845	.880	.864	.863	S.	N.	NW.	0.3	.3	.3	.1	N. 45 W.	10	10	10	......	....
.860	.864	.810	.844	NW.	NW.	W.	1.8	.6	2.4	1.4	N. 68 W.	10	10	10	......	....
.811	.694	.807	.771	....	....	....	....	....	....	0.9	N. 79 W.	6.3	5.3	4.3	......	0.46

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.830	29.718	29.711	29.773	5	19	1	6	21	2	9.7	25	1	.043	.080	.034	.052
2*	29.448	29.321	29.253	29.340	6	17	14	7	18	15	13.3	21	0	.046	.083	.071	.068
3	29.337	29.336	29.339	29.337	8	11	9	9	12	10	10.3	17	7	.051	.061	.054	.055
4	29.293	29.283	29 271	29.282	— 2	19	12	— 1	21	14	11.3	22	— 5	.028	080	.054	.053
5	29.438	29.369	29.454	29.420	12	12	—6	14	13	—5	7.3	20	— 5	.052	.063	.046	.053
6	29.698	29.677	29.650	29.675	—18	5	—2	—17	60	0	—3.7	9	—18	.007	.043	.025	.025
7	29.436	29.327	29.364	29. 76	3	17	8	5	18	10	11.0	23	— 4	.027	.083	.040	.050
8	29.283	29.390	29.495	29.389	10	27	28	11	29	29	23.0	31	— 1	.057	.124	.142	.107
9	29.418	29.446	29.531	29.465	19	39	23	21	41	25	29.0	45	16	.080	.212	100	.130
10	29.200	28.893	28.935	29.009	32	35	30	34	42	32	36.0	43	15	.151	.113	.144	.136
11	29.125	29.279	29.340	29.248	28	32	24	29	37	25	30.0	38	20	.142	.116	.117	.125
12	29.293	29.058	29.005	29 119	23	29	31	24	30	35	29.3	35	14	.112	149	.183	.148
13	28.740	28.859	29.210	28.936	34	38	28	35	40	30	35.0	42	30	.183	.203	.130	.172
14	29.334	28.917	28.980	29.077	27	29	20	28	30	22	26.7	34	21	.136	.149	.085	.12[illegible]
15	29.011	29.027	29.168	29.074	17	24	20	18	25	22	21 7	26	16	.083	.117	.085	.095
16	29.319	29.445	29.578	29.447	11	17	11	12	18	12	14.0	22	11	.061	.084	.061	.068
17	29.735	29.318	29 383	29.489	1	20	19	2	21	22	15.0	23	0	.034	.096	.069	.066
18	29.106	29 188	29.583	29.292	25	38	20	26	42	23	30.3	45	20	.123	.177	.074	.124
19	30.014	30.019	29 869	29.967	5	15	2	6	16	3	8.3	23	3	.043	.074	.036	.051
20	29.826	29.601	29.435	29.621	— 5	25	26	— 4	28	28	17.3	31	— 8	.023	.100	.117	.080
21	29.303	29.387	29.347	29.346	27	33	24	29	35	27	30.3	36	24	.124	.162	.095	.127
22	29.313	29.457	29.548	29.439	17	28	22	18	31	23	24.0	36	16	.083	.119	.107	.103
23	29.543	29.360	29.187	29.363	23	25	27	25	26	28	26.3	35	20	.100	123	.136	.119
24	28.860	28 912	29.102	28.958	32	31	25	33	35	26	31.3	36	25	.168	.183	.123	.158
25	29.195	29.067	29.065	29.309	21	34	24	22	36	25	27.3	40	20	.101	.170	.117	.129
26	29.033	29.045	29.280	29.119	24	29	23	25	30	26	27.0	31	23	.117	.149	.089	.118
27	29.153	29.105	28.945	29.068	17	25	20	18	26	21	21.7	30	16	.083	.123	096	.100
28	28.931	28.960	29.140	29.010	22	30	27	23	34	30	29.0	36	20	.107	.121	.113	.113
29	29.272	29.304	29.501	29.325	15	22	7	16	23	8	15.7	32	8	.074	.107	.048	.076
30	29.505	29.358	29.363	29.409	1	26	11	2	30	12	14.7	32	2	.034	.106	.061	.067
31	29.464	29.059	29.062	29 195	20	35	35	21	42	37	33.3	44	8	.096	113	.178	.129
Means.....	29.337	29.275	29.322	29.312	14.9	25.4	18.2	16.0	27.6	19.6	21.1	....	...	.082	.119	.091	.097
1863.																	
January 1	29.110	28.947	28.807	28.954	21	34	31	22	37	32	30.3	38	20	.101	.157	.162	.140
2	28.707	28.592	28.674	28.657	36	40	39	37	42	40	39.7	45	31	.199	.221	225	.215
3	28.912	28.907	28.937	28.918	29	36	25	30	38	26	31 3	41	25	.149	.186	.123	.152
4	28.893	28.823	28.900	28.872	13	24	18	14	25	20	19.7	29	14	.067	.117	.076	686
5	28.974	29.023	29.161	29.056	11	16	8	12	18	9	13.0	20	8	.061	067	.051	.059
6	29.283	29.389	29.489	29.387	0	10	—3	1	12	—2	3.7	14	— 2	.032	.046	.026	.034
7	29.596	29.519	29.562	29.559	— 6	9	—5	— 5	10	—4	0.3	12	— 9	021	.054	023	.032
8	29.564	29.499	29.489	29.517	— 4	16	3	— 3	19	4	67.0	21	— 6	.025	.056	.038	.039
9	29 353	29.046	28.945	29.114	3	24	25	4	25	27	18.7	26	— 1	.038	.117	112	.085
10	28 956	28.945	29.076	28.992	18	17	6	19	18	8	15.0	30	8	087	.083	.034	.068
11	29.200	29.303	29.183	29.288	7	24	17	8	25	19	17.3	27	7	.048	.117	.071	.078
12	29.341	29.531	29.567	29.479	19	23	18	20	25	20	21.7	29	16	.092	.100	076	.089
13	29.231	28.950	28.770	28.983	24	26	28	25	27	29	27.0	31	19	.117	.117	.142	.125
14	29.029	29.108	29.261	29.132	8	14	5	9	15	6	10.0	30	5	.051	.071	.043	.055
15	29.476	29.486	29.594	29 518	— 3	2	—8	— 2	3	—7	—2.0	5	—10	.026	.036	.018	.026
16	29.486	29.393	29.407	29.418	—16	6	3	—15	7	4	—1.3	9	—17	.009	.046	.038	.031
17	29.406	29.414	29.414	29.411	— 6	16	16	— 5	17	17	9.7	18	— 7	.021	.078	.078	.059
18	29.327	29.385	29.533	29.415	13	26	19	14	28	20	20.7	29	12	.067	.117	.092	092
19	29.710	29.703	29.663	29.692	— 3	25	28	— 2	28	30	18.0	30	— 3	.026	.100	.130	.185
20	29.552	29.412	29.447	29.470	30	33	32	31	34	33	32 7	35	29	.155	.175	168	.166
21	29.550	29.356	29.342	29.416	30	35	32	32	36	33	33.7	38	30	.144	.191	.168	.167
22	29.325	29.435	29.457	29.406	31	35	31	32	37	32	33.7	38	30	162	.178	.162	.167
23	29.501	29.323	29.163	29.329	25	26	29	26	27	30	27.7	33	25	.123	.129	.149	.133
24	29.033	29.162	29.350	29.181	30	29	22	32	30	23	28.3	33	29	144	.149	.107	.133
25	29.451	29.385	29.430	29.422	15	33	26	16	37	27	26.7	37	9	.074	.136	.129	.113
26	29 587	29.551	29.574	29.537	7	20	14	8	22	15	15.0	30	5	.048	.085	071	.068
27	29.633	29.503	29.456	29 530	7	18	12	8	19	14	19.7	25	8	.048	.087	.063	.066
28	29.203	29.011	29.010	29.074	8	30	26	9	33	28	23.3	34	8	.051	.132	.117	.106
29	28 898	28.988	29.208	29.028	30	29	20	31	30	22	27 7	32	20	.115	.149	085	.116
30	29.347	29.201	29.193	29.183	5	26	20	6	29	22	19.0	22	2	.043	.106	.065	.078
31	29.376	29.283	29.101	29.253	5	4	10	6	5	12	7.7	28	— 7	.043	.041	.046	.043
Means.....	29.291	29.244	29.263	29 266	12.1	22.7	17.6	13.5	24.4	19.0	18.9	....	..	.077	.111	.093	.094

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*Snow nearly all day.

of the north and northwestern lakes, at Superior, Wisconsin.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation. U. S. inches and decimals.	Am't of rain or melted snow. U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction. From whence.			Velocity. In miles per hour.			Resultant velocity. In miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°		7 a. m.	2 p. m.	9 p. m.		
.760	.712	.718	.730	NW. ...	SW. ..	SW. ..	2.0	1.2	3.6	1.7	S. 68 W.		0	1	0	......	....
.769	.840	.823	.810	NW.	N.	N.	3.6	1.2	0.6	1.6	N. 30 W.		10	10	10	......	....
.784	.804	.791	.793	SW.	W. ..	SW. ..	2.4	1.2	0.3	1.2	N. 64 W.		10	10	10	......	0.14
.683	.712	.635	.676	SW.	NW. ..	NW. ..	0.3	2.4	5.4	2.6	N. 47 W.		10	6	5	......	....
.635	.810	.769	.738	NW.	N.NW.	NW. ..	4.6	4.0	6.4	4.9	N. 39 W.		6	0	0	......	....
.386	.760	.480	.535	NW.	NW. ..	SW. ..	3.6	2.4	1.2	2.0	N. 56 W.		0	10	0	......	....
.500	.840	.582	.640	SW.	N.	NW. ..	2.4	6.0	2.4	1.2	N. 80 W.		0	0	0	......	....
.797	.775	.887	.786	S.	SW. ..	SW. ..	3.6	4.0	2.4	3.1	S. 29 W.		8	10	10	......	....
.712	.824	.746	.760	SW.	SW. ..	SW. ...	1.2	2.4	1.2	1.6	S. 45 W.		8	0	0	......	....
.792	.420	.794	.668	SW.	SW. ..	SW. ...	0.6	0.3	4.2	1.7	S. 45 W.		0	0	6	......	....
.887	.527	.872	.762	E	NW. ..	NE. ...	2.6	0.3	3.6	2.1	N. 65 E..		0	0	0	......	....
.8[illegible]8	.890	.898	.852	E.......	E.	NE. ..	4.0	6.4	8.4	5.8	N. 71 E..		10	10	10	......	....
.898	.820	.782	.833	E.......	SW. ..	SW. ...	2.4	2.4	6.4	2.4	S. 32 W.		10	10	10	......	0.45
.883	.890	.721	.831	N.	NW. ..	W. ..	0.3	0.3	1.2	0.5	N. 70 W.		10	10	10	......	....
.840	.872	.721	.811	NW.	NW. ..	SW. ..	1.2	0.6	2.4	1.0	S. 80 W.		10	10	10	......	0.15
.804	.840	.804	.816	NW.	NW. ..	NW. ..	3.6	2.4	1.2	2.4	N. 45 W.		10	10	10	......	0.06
.718	.855	.584	.719	SW.	SW. ..	SW. ..	0.6	2.4	2.4	1.8	S. 45 W.		0	10	0	......	....
.876	.661	.598	.778	S.SW. ..	SW. ..	W. ..	3.6	3.6	6.4	3.9	S. 60 W.		0	0	0	......	....
.760	.829	.730	.773	NE......	E.	NW..	4.0	1.2	0.3	1.6	N. 52 E..		10	3	0	......	....
.645	.655	.768	.689	E.	E.	SW. ..	0.3	1.2	6.4	1.8	S. 34 W.		0	0	0	......	....
.775	.797	.644	.705	W..	SW. ..	SW. ..	2.4	3.0	6.4	3.7	S. 54 W.		3	7	0	......	....
.840	.685	.864	.796	SW.	SW. ..	NE. ...	0.3	0.9	5.4	1.4	N. 45 E..		0	0	10	......	....
.746	.876	.883	.835	E.	E.	NE...	1.2	5.4	8.4	4.7	N. 65 E..		10	10	10	......	....
.893	.898	.876	.889	E.	SW. ..	SE. ...	0.6	3.6	3.6	1.7	S. 7 E..		10	10	8	......	....
.860	.802	.872	.844	SW	SW. ..	E.	0.3	1.4	0.3	0.5	S. 37 W.		0	0	10	......	....
.872	.890	.634	.798	NW. ..	SW. .	SW. ..	0.3	0.6	0.3	0.3	S. 63 W.		10	10	0	......	....
.840	.876	.855	.857	W..	S......	SW. ..	0.3	1.2	0.6	0.6	S. 25 W.		10	10	0	......	....
.864	.617	.675	.718	W..	W.. ..	SW. ..	0.3	0.3	2.4	1.2	S. 62 W.		10	3	6	......	....
.829	.864	.777	.823	W..	SW. ..	SW. ..	1.2	2.4	1.2	1.5	S. 56 W.		8	3	0	......	....
.7[illegible]8	.665	.804	.729	SW.	SW. ..	SW..	1.2	0.6	0.6	0.8	S. 45 W.		0	0	0	......	....
.855	.420	.807	.694	SW.	S.SW.	SE.. ..	0.3	3.0	6.4	2.7	S. 23 E..		0	0	0	......	...
.776	.765	.754	.764	....	....	....	....	....	....	0.5	S. 75 W.		5.6	5.2	4.4	......	0.80
.860	.712	.896	.822	S.	W.. ..	W.	0.6	0.3	0.3	0.3	S. 45 W.		6	8	10	......	....
.903	.829	.910	.886	S.	SE...	SW. ..	2.4	0.3	0.3	0.9	South ...		8	10	10	......	....
.890	.811	.876	.839	SW.	E.	SW. ..	0.3	0.3	1.2	0.4	S. 35 W.		10	0	0	......	....
.816	.872	.702	.796	SW.	SW. ..	SW. ..	1.2	0.6	2.4	1.4	S. 45 W.		0	10	10	......	....
.804	.682	.781	.756	W..	W.. ..	W.	0.3	4.8	3.6	2.9	West....		6	8	7	......	....
.707	.610	.671	.662	W..	W.. ..	SW. ...	0.3	5.4	0.3	1.9	S. 88 W.		00	0	7	......	....
.627	.791	.645	.687	SW.	SW. ..	SW. ...	0.3	1.2	0.3	0.6	S. 45 W.		3	10	7	......	....
.658	.541	.740	.646	SW.	SW. ..	SE. ...	1.2	0.6	1.2	0.7	S. 11 W.		10	8	8	......	....
.740	.872	.761	.791	SW.	E.	NE. ...	0.3	0.3	2.4	0.8	N. 50 E..		3	3	8	......	....
.815	.840	.553	.746	NW.	NW. ..	NW. ..	2.4	3.0	1.2	2.2	N. 45 W.		10	4	0	......	....
.785	.872	.692	.749	W..	S......	SE. ...	0.3	0.6	0.3	0.3	S. 7 W.		10	10	10	......	0.04
.850	.746	.702	.766	W..	E	NE. ...	1.2	1.2	8.4	2.8	N. 45 E..		7	2	6	......	....
.872	.768	.887	.842	NE.	NE. ...	SW. ..	9.6	8.4	1.2	5.6	N. 45 E..		10	10	10	......	....
.784	.823	.760	.789	SW.	W.. ..	W.	3.6	6.0	2.4	3.7	S. 77 W.		6	7	10	......	0.03
.671	.730	.594	.665	W..	W.. ..	SW..	2.4	4.8	3.6	3.3	S. 75 W.		8	10	10	......	....
.[illegible]23	.769	.740	.644	SW.	N. ..	N.	2.4	0.3	0.3	0.7	S. 56 W.		10	7	10	......	....
.627	.834	.834	.765	SW.	SW. .	E. . ..	0.3	1.0	0.3	0.3	S. 34 W.		0	10	7	......	....
.816	.768	.850	.811	S........	SW. ..	SW. ..	0.3	2.8	0.3	1.0	S. 41 W.		10	10	10	......	....
.671	.655	.782	.703	SW.	NE...	NE. ...	1.0	3.0	6.4	2.8	N. 45 E..		10	10	6	......	...
.893	.895	.893	.893	E.	NE. ...	NE. ...	3.6	2.0	0.3	1.8	N. 73 E..		10	10	10	......	....
.794	.900	.897	.862	E.	SW. ..	SW. ..	0.3	0.3	0.3	0.1	S. 14 W.		10	10	10	......	0.04
.896	.807	.896	.860	E.	SE. ..	SE.. ..	0.3	1.3	2.0	0.7	S. 56 E..		10	7	10	......	...
.876	.880	.890	.882	E.	E.	E.	7.2	10.0	16.0	11.1	East.....		10	10	10	......	....
.794	.890	.864	.849	W..	SW. ..	SW. ..	0.3	0.3	2.4	0.9	S. 49 W.		10	10	10	......	0.40
.829	.619	.880	.776	SW.	SW. ..	SW. ..	0.3	3.0	2.4	1.9	S. 45 W.		10	3	0	......	....
.785	.721	.823	.776	SW.	SW. ..	NE. ...	0.3	2.2	3.6	0.4	N. 45 W.		0	10	0	......	....
.785	.845	.810	.813	NW.	SW. ..	SW. ..	1.0	3.6	2.4	2.0	S. 54 W.		10	7	10	......	....
.781	.7[illegible]3	.768	.751	SW.	SW. ..	SW. ..	0.6	3.0	1.2	1.6	S. 45 W.		0	0	3	......	....
.893	.890	.721	.834	NE......	NE ...	NE. ...	3.6	9.6	8.4	7.2	N. 45 E.		10	10	0	......	....
.750	.665	.721	.715	SW.	SW. .	SW. ..	0.3	5.4	6.4	4.0	S. 45 W.		8	0	10	......	0.12
.760	.750	.610	.706	NW.	N.	NE ...	1.2	1.2	6.4	2.5	N. 30 E.		0	10	10	......	....
.780	.770	.779	.777	....	....	....	....	....	....	0.1	N. 50 E..		6.9	7.2	7.3	......	0.63

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	29.032	29.115	29.396	29.181	3	1	—14	5	2	—14	—2.3	20	—14	.027	.034	.022	.027
2	29.629	29.692	29.690	29.670	....	—11	—22	—28	—10	—22	—20.0	8	—28	....	.014	.015	.014
3	29.826	29.808	29.765	29.796	....	— 8	—22	—38	— 7	—20	—21.7	— 5	—38	....	.018	..	.018
4	29.640	29.533	29.523	29.565	— 2	11	8	— 1	12	10	7.0	15	—23	.028	.061	.040	.043
5	29.619	29.513	29.469	29.533	—13	17	0	—12	19	1	2.7	25	—15	.012	.071	.032	.038
6	29.160	29.019	28.983	29.054	— 7	16	20	— 6	17	23	11.3	25	— 8	.020	.078	.074	.057
7	29.311	29.441	29.712	29.488	1	10	— 3	2	11	— 2	3.7	25	— 2	.034	.057	.026	.039
8	29.863	29.856	29.800	29.839	— 8	6	13	— 7	8	15	5.3	15	—12	.018	.034	.035	.029
9	29.503	29.335	29.445	29.427	17	18	18	18	20	20	19.3	25	12	.083	.076	.076	.078
10	29.700	29.628	29.601	29.643	— 3	11	6	— 2	12	8	6.0	23	— 4	.026	.061	.034	.040
11	29.581	29.524	29.527	29.544	2	11	7	3	16	10	9.7	19	2	.036	.059	.026	.040
12	29.618	29.516	29.551	29.561	8	18	0	9	19	1	9.7	21	1	.051	.087	.032	.056
13	29.566	29.366	29.316	29.416	8	22	20	9	23	22	18.0	28	— 5	.051	.107	.085	.081
14	28.773	28.547	28.980	28.766	29	32	18	30	34	20	21.3	35	17	.149	.155	.076	.127
15	29.490	29.536	29.689	29.572	2	14	— 3	3	15	0	6.0	22	0	.036	.071	.005	.037
16	29.737	29.493	29.411	29.547	—14	17	19	—13	18	20	8.3	24	— 7	.011	.083	.092	.062
17	29.214	29.112	29.087	29.137	21	35	33	25	38	31	31.3	39	19	.101	.186	.175	.154
18	29.013	28.718	29.117	29.035	36	40	22	36	45	23	34.7	47	23	.212	.182	.107	.167
19	29.261	29.220	29.275	29.252	15	21	13	16	25	14	18.3	28	12	.074	.117	.067	.086
20	29.593	29.644	29.744	29.660	8	17	6	9	19	7	11.7	22	6	.051	.071	.046	.056
21	29.916	29.637	29.799	29.784	0	18	13	1	19	14	11.3	21	— 9	.032	.087	.067	.062
22	29.663	29.581	29.571	29.606	— 2	22	14	— 1	21	15	12.7	26	— 7	.028	.095	.171	.064
23	29.438	29.320	29.345	29.367	2	32	27	3	35	28	22.0	35	— 3	.036	.142	.136	.104
24	29.363	29.321	29.349	29.337	27	35	28	28	40	29	32.3	41	27	.136	.139	.142	.139
25	29.363	29.281	29.274	29.306	27	30	30	28	35	31	31.3	39	21	.136	.109	.155	.133
26	29.113	29.022	29.132	29.089	28	3	30	28	34	31	31.0	35	28	.142	.168	.155	.155
27	29.328	29.394	29.356	29.359	12	29	27	13	31	28	24.0	34	11	.063	.137	.136	.112
28	29.308	29.191	29.437	29.312	25	40	22	26	44	23	31.0	44	17	.123	.195	.107	.144
Means	29.450	29.377	29.431	29.423	9.5	18.6	12.2	6.5	21.3	13.1	13.6	....	....	.066	.096	.076	.079
March 1	29.209	29.160	29.261	29.176	9	28	22	10	30	23	21.0	32	5	.054	.130	.107	.097
2	29.334	29.400	29.533	29.422	12	27	19	13	28	20	20.3	30	5	.063	.133	.092	.097
3	29.566	29.573	29.449	29.529	17	18	18	19	19	19	19.0	25	17	.071	.087	.087	.081
4	29.781	29.493	29.436	29.570	— 9	21	18	— 8	22	19	11.0	25	—10	.017	.101	.087	.068
5	28.981	28.825	29.060	28.955	23	33	16	24	34	17	25.0	35	16	.112	.175	.078	.121
6	29.357	29.431	29.459	29.415	3	23	— 1	4	24	0	9.3	25	0	.038	.112	.030	.060
7	29.417	29.193	29.111	29.240	—10	24	21	— 9	26	22	13.0	27	—10	.016	.106	.101	.074
8	29.014	28.983	28.959	28.985	15	20	11	16	22	12	16.7	24	10	.074	.085	.061	.073
9	29.086	29.287	29.143	29.172	— 7	20	17	— 4	22	18	12.7	27	— 5	..	.085	.083	.084
10	29.349	29.088	29.273	29.236	18	36	11	19	38	20	25.7	38	16	.087	.182	.092	.120
11	29.473	29.505	29.544	29.507	2	24	11	3	26	12	13.7	26	1	.036	.106	.061	.067
12	29.711	29.648	29.628	29.662	— 4	29	18	— 3	31	19	15.7	32	— 4	.025	.137	.087	.083
13	29.673	29.535	29.393	29.534	7	22	20	8	23	24	18.3	26	0	.018	.095	.112	.075
14	29.103	29.024	29.068	29.065	20	30	27	21	34	28	27.7	36	20	.096	.121	.136	.117
15	29.200	29.271	29.384	29.285	27	34	24	28	36	24	29.3	38	24	.136	.170	.112	.139
16	29.401	29.215	29.196	29.270	18	43	28	19	44	30	31.0	50	15	.087	.261	.130	.160
17	29.322	29.522	29.613	29.485	29	27	24	30	28	23	27.0	34	20	.149	.135	.107	.130
18	29.734	27.240	29.688	29.551	8	26	20	9	28	25	20.7	30	6	.051	.117	.100	.089
19	29.121	29.077	29.053	29.084	18	30	29	20	32	30	27.3	33	20	.076	.144	.149	.123
20	29.548	29.390	29.380	29.439	27	31	28	28	34	30	30.7	35	25	.133	.139	.130	.135
21	29.328	29.291	29.264	29.294	29	35	29	30	41	31	34.0	45	28	.149	.134	.137	.140
22	29.190	29.194	29.150	29.178	33	32	30	34	33	31	32.7	36	29	.175	.168	.155	.166
23	29.202	29.218	29.213	29.211	33	39	28	33	45	30	36.0	45	30	.188	.160	.130	.159
24	29.055	29.004	29.190	29.083	20	31	20	22	33	22	25.7	....	20	.085	.151	.085	.107
25	29.305	29.294	29.403	29.334	19	30	18	20	31	20	23.7	....	20	.092	.155	.076	.107
26	29.351	29.258	29.280	29.296	12	31	27	13	35	28	25.3	....	10	.063	.128	.136	.109
27	29.204	29.191	29.314	29.236	27	37	25	24	40	28	31.0	....	21	.136	.181	.100	.139
28	29.547	29.533	29.621	29.567	13	24	18	14	28	19	20.3	...	12	.067	.083	.087	.079
29	29.757	29.615	29.523	29.631	14	28	25	15	30	27	24.0	...	5	.071	.130	.112	.104
30	29.365	29.311	29.491	29.400	28	35	30	29	40	32	33.7	...	25	.142	.160	.144	.148
31	29.729	29.558	29.390	29.557	12	27	24	13	31	26	23.3	...	12	.063	.101	.106	.090
Means	29.368	29.301	29.347	29.335	14.2	28.9	21.4	16.1	31.2	22.9	23.4		...	.087	.131	.103	.108

of the north and northwestern lakes, at Superior, Wisconsin.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Means.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.500	.718	1.000	.739	NW	NW	SW	10.6	8.4	6.4	6.7	N. 69 W.	10	0	0	......	....
......	.539	1.000	.769	SW	W	SW	1.0	3.0	1.2	1.6	S. 71 W.	0	0	0	......	....
......	.591	......	.594	SW	NW	SE	2.4	4.0	1.2	1.2	N. 85 W.	0	0	0	......	....
.683	.804	.582	.689	S	SE	SW	3.0	0.8	0.3	1.1	S. 78 E.	10	10	10	......	....
.519	.692	.707	.639	SW	SW	SW	2.0	0.3	0.3	0.9	S. 45 W.	0	0	0	......	0.22
.611	.834	.598	.681	SW	N	SW	0.3	1.2	0.3	0.3	N. 27 W.	10	10	10	......	....
.718	.797	.671	.728	W	W	SW	5.4	6.0	6.4	5.5	S. 74 W.	6	10	10	......	....
.594	.553	.648	598	SW	SW	NE	1.2	0.3	4.6	1.0	N. 45 E.	10	5	10	......	....
.840	.702	.702	.748	E	E	SW	6.4	0.3	1.2	2.0	S. 82 E.	10	10	10	......	....
.691	.804	.553	.682	W	SW	SW	4.0	1.0	1.6	2.0	S. 72 W.	0	10	10	......	0.13
.730	.639	.377	.588	W	SE	W	0.3	0.6	4.6	1.5	S. 85 W.	0	10	0	......	....
.784	.845	.707	.778	N. NW	NE	NE	3.6	1.0	0.3	1.4	N. 6 W.	10	0	0	......	....
.784	.864	.721	.789	SW	E	NE	0.6	4.0	6.8	3.2	N. 62 E.	10	10	10	......	....
.890	.792	.702	.794	NE	SW	SW	4.0	0.3	4.6	0.3	S. 45 W.	10	10	10	......	....
.730	.823	......	.776	W	SW	SW	3.6	6.0	0.3	3.1	S. 61 W.	10	10	0	......	....
.474	.840	.850	.721	N	E	NE	2.0	1.0	0.3	0.8	N. 29 E.	5	3	10	......	0.30
.860	.811	.895	.855	N	N	NE	0.3	0.3	0.3	0.2	N. 14 E.	10	0	10	......	....
1.000	.607	.864	.823	SW	SW	W	2.0	3.0	2.4	2.3	S. 59 W.	0	10	6	......	....
.829	.872	.816	.839	NW	NW	SW	1.0	1.2	0.3	0.7	N. 53 W.	10	3	0	......	....
.784	.692	.769	.748	W	SE	SE	2.0	1.2	0.3	0.4	S. 45 W.	0	0	0	......	....
.707	.845	.816	.789	SW	SW	NE	0.3	4.8	1.2	1.3	S. 45 W.	0	0	0	......	....
.683	.738	.823	.748	N	NE	NE	0.3	0.3	0.3	0.2	N. 31 E.	0	0	0	......	....
.730	.698	.883	770	N	SW	SW	1.0	8.4	0.3	2.7	S. 50 W.	10	10	10	......	....
.883	.557	.887	.775	SW	S	SW	0.6	0.3	2.4	1.0	S. 41 W.	10	0	6	......	....
.883	.537	.893	.771	S. SW	N	NE	0.3	0.3	3.0	1.0	N. 42 E.	10	6	10	......	....
.887	.893	.893	.891	E	E	E	8.4	2.0	1.2	3.9	East.	10	3	10	......	....
.810	.788	.883	.827	NE	NE	NE	0.3	1.0	0.3	0.5	N. 45 E.	10	0	3	......	0.18
.876	.677	.864	.806	SW	SW	NE	0.3	0.3	0.3	0.1	S. 45 W.	10	0	0	......	....
.749	.734	.710	731	....	....	....	....	....	....	0.5	S. 87 W.	6.4	4.6	5.1	......	0.73
.791	.782	.864	.812	NW	N	NE	1.0	0.3	3.6	1.3	N. 27 E.	10	2	0	......	....
.810	.883	.850	.847	N. NW	E	E	0.6	6.4	4.8	3.6	N. 87 E.	8	10	0	......	....
.692	.845	.845	.794	E	NE	N	1.0	9.0	7.4	5.2	N. 28 E.	10	10	10	......	....
.577	.860	.845	.760	N. W	N	NE	1.0	3.0	2.4	1.8	N. 11 N.	0	3	10	......	0.07
.868	.895	.834	.865	SW	SW	NW	0.3	1.2	10.0	3.4	N. 53 E.	10	10	3	......	....
.740	.868	.695	.767	NW	NW	NW	1.0	3.6	0.3	1.6	N. 45 W.	0	0	0	......	0.03
.557	.745	.860	.787	NW	NE	NE	1.0	1.2	0.2	5.3	N. 7 E.	0	0	10	......	....
.829	.721	.804	.784	NW	SW	SW	3.0	10.0	14.4	8.3	S. 51 W.	10	0	10	......	....
......	.721	.840	.780	SW	W	SW	3.0	7.4	2.0	3.8	S. 72 W.	0	0	0	......	....
.845	.811	.850	.835	SW	NW	NW	3.6	4.8	3.0	2.8	N. 70 W.	0	0	0	......	....
.730	.754	.804	.762	W	W	W	2.0	3.0	2.4	2.4	West.	0	0	0	......	....
.658	.788	.845	.763	W	W	W	0.3	4.8	4.0	3.0	West.	0	0	0	......	....
.777	.758	.868	.794	SW	N	NE	0.3	0.6	0.3	0.2	North.	10	10	10	......	....
.855	.617	.883	.785	E	E	NE	0.3	2.1	6.0	2.6	N. 57 E.	10	0	10	......	....
.883	.802	.868	.851	NW	NE	NE	0.3	2.4	0.3	0.9	N. 39 E.	0	10	6	......	....
.845	.918	.782	.848	W	S	SW	1.0	3.0	0.3	1.1	S. 21 W.	0	7	10	......	....
.890	.888	.864	.845	NE	E	E	5.4	8.4	1.2	4.7	N. 74 E.	10	10	7	......	....
.784	.768	.746	.766	SE	NE	NE	0.6	2.8	6.4	3.0	N. 49 E.	0	3	6	......	....
.702	.794	.890	.795	E	NE	NE	0.3	9.6	7.8	5.8	N. 46 E.	0	0	10	......	....
.883	.712	.782	.792	E	E	NE	5.6	4.0	2.4	3.8	N. 81 E.	10	7	10	......	....
.890	.500	.788	.726	SW	S	NE	0.3	2.0	0.3	0.7	South.	10	0	0	......	....
.895	.893	.893	.893	NE	E	NE	6.8	9.6	12.6	9.0	N. 60 E.	10	10	10	......	....
1.000	.533	.788	.773	NE	W	SW	2.0	8.4	0.3	2.4	N. 80 W.	10	3	0	......	0.33
.721	.800	.721	.747	W	NW	W	3.0	6.0	2.4	3.5	N. 66 W.	0	4	0	......	....
.850	.893	.702	.815	N	N	W	0.6	3.0	4.2	1.8	N. 50 W.	0	3	0	......	....
.810	.628	.883	.773	NW	E	E	0.3	2.4	0.6	0.9	N. 86 E.	0	2	0	......	....
.883	.732	.655	.756	N. NW	NW	S	0.3	0.3	2.4	0.7	S. 81 W.	10	10	0	......	....
.816	.543	.845	.734	W	W	NW	4.6	14.4	3.6	7.2	N. 83 W.	0	0	0	......	....
.823	.782	.761	.788	N	E	SE	0.6	1.6	0.3	0.6	N. 78 E.	0	0	10	......	....
.883	.645	.794	.775	SW	NW	W	1.2	3.2	7.6	3.5	N. 88 W.	0	10	3	......	....
.810	.582	.754	.715	NW	NW	SW	10.0	1.2	1.2	3.7	N. 51 W.	0	0	0	......	....
.803	.756	.813	.791	....	....	....	....	....	....	0.9	N. 20 W.	4.1	4.3	4.3	......	0.43

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	28.913	28.644	28.618	28.725	28	58	50	30	63	52	48.3	....	23	.130	.416	.334	.293
2	28.937	28.986	29.376	29.100	32	25	24	34	45	23	34.0	....	22	.155	.074	.107	.112
3	29.679	29.728	29.577	29.661	17	26	22	18	28	25	23.7	....	15	.083	.117	.084	.095
4	29.433	29.310	29.514	29.419	22	45	42	23	58	43	41.3	....	18	.107	.129	.254	.163
5	29.521	29.515	29.513	29.516	38	40	31	40	45	35	40.0	....	35	.203	.184	.180	.189
6	29.700	29.358	29.729	29.596	28	30	27	29	33	30	30.7	....	23	.142	.132	.113	.129
7	29.722	29.697	29.769	29.729	26	30	26	27	33	28	29.3		25	.129	.132	.117	.159
8	29.688	29.501	29.484	29.556	23	35	30	24	38	32	31.3	....	19	.112	.165	.144	.140
9	29.391	29.139	29.131	29.220	31	46	40	35	54	43	44.0	....	30	.183	.206	.208	.199
10	29.065	29.034	29.065	29.055	32	40	35	33	42	36	37.0	....	30	.168	.221	.191	.193
11	29.155	29.358	29.474	29.329	34	35	28	35	39	30	34.7	....	30	.183	.152	.130	.155
12	29.600	29.448	29.382	29.477	19	38	28	20	40	31	30.3	....	17	.092	.203	.119	.138
13	29.390	29.358	29.518	29.422	33	38	30	34	42	33	36.3	....	28	.175	.177	.132	.161
14	29.430	29.348	29.358	29.379	28	38	37	29	41	38	36.0	....	25	.142	.190	.207	.180
15	29.334	29.257	29.233	29.265	25	39	36	36	43	37	38.7	....	31	.191	.186	.199	.192
16	29.219	29.215	29.174	29.203	35	41	36	36	44	37	39.0	....	32	.191	.218	.199	.203
17	29.075	28.959	28.951	28.995	35	42	37	38	46	38	40.7	....	31	.165	.215	.207	.196
18	28.929	28.983	29.084	28.999	38	41	38	40	44	40	41.3	....	35	.203	.218	.203	.208
19	29.180	29.224	29.314	29.239	35	36	36	36	36	36	36.0	....	35	.191	.212	.212	.205
20	29.535	29.574	29.590	29.566	35	36	36	35	37	37	36.3	....	33	.204	.199	.199	.201
21	29.580	29.562	29.582	29.575	36	38	39	37	40	40	39.0	....	35	.199	.203	.225	.209
22	29.572	29.515	29.511	29.533	38	40	37	39	43	38	40.0	....	36	.216	.208	.207	.210
23	29.504	29.380	29.373	29.419	34	48	40	35	54	43	44.0	....	27	.183	.256	.208	.216
24	29.381	29.523	29.531	29.478	40	40	35	43	42	37	40.7	....	30	.208	.221	.178	.202
25	29.552	29.505	29.498	29.518	38	38	35	39	43	38	40.0	....	35	.216	.164	.165	.182
26	29.514	29.492	29.478	29.495	37	48	43	38	50	45	44.3	....	26	.207	.309	.251	.256
27	29.394	29.246	29.243	29.294	38	53	45	40	67	48	51.7	....	30	.203	.217	.260	.227
28	29.424	29.411	29.426	29.420	38	38	36	39	39	37	38.3	....	36	.216	.216	.199	.210
29	29.390	29.337	29.338	29.335	37	48	37	38	55	41	44.7	....	26	.207	.243	.168	.206
30	29.349	29.166	29.174	29.163	35	47	47	36	53	51	46.7	....	28	.191	.244	.277	.237
Means....	29.385	29.326	29.342	29.351	32.6	40.2	35.5	33.8	44.5	37.4	38.6	....	....	.173	.201	.189	.188
May 1	29.121	29.157	29.288	29.189	54	45	36	53	50	38	47.0	....	38	.321	.234	.186	.247
2	29.410	29.426	29.417	29.418	34	34	34	35	35	35	35.0	....	34	.183	.183	.183	.183
3	29.300	29.282	29.274	29.285	36	37	36	37	38	37	37.3	....	33	.199	.207	.199	.202
4	29.250	29.314	29.410	29.335	37	34	35	37	34	35	35.3	....	32	.220	.196	.204	.207
5	29.580	29.638	29.628	29.615	37	28	33	38	40	34	37.3	....	28	.207	.203	.175	.195
6	29.585	29.525	29.495	29.535	31	43	40	33	50	48	42.0	....	24	.151	.186	.208	.182
7	29.419	29.307	29.266	29.331	38	45	35	40	51	38	43.0	....	27	.203	.220	.165	.196
8	29.221	29.322	29.357	29.300	50	53	45	53	63	51	55.7	....	29	.321	.270	.220	.270
9	29.393	29.257	29.211	29.290	40	42	39	43	47	40	43.3	....	35	.208	.202	.225	.212
10	29.266	29.333	29.368	29.322	40	44	42	42	45	43	43.3	....	38	.221	.275	.254	.250
11	29.424	29.340	29.355	29.373	35	43	38	36	48	40	41.3	....	27	.191	.212	.203	.202
12	29.464	29.387	29.364	29.405	40	50	48	42	66	52	53.3	....	35	.221	.150	.282	.218
13	29.385	29.445	29.467	29.432	40	47	40	42	52	43	45.7	....	40	.221	.257	.208	.229
14	29.601	29.495	29.445	29.514	40	49	40	42	51	43	46.3	....	30	.221	.282	.208	.237
15	29.195	29.051	29.159	29.128	38	48	50	39	50	52	47.0	....	38	.216	.309	.334	.286
16	29.253	29.265	29.348	29.289	41	43	40	45	50	44	46.3	....	41	.205	.186	.195	.195
17	29.518	29.465	29.480	29.488	41	50	42	45	57	45	49.0	....	34	.205	.268	.228	.234
18	29.478	29.341	29.311	29.378	43	55	55	47	72	58	59.0	....	35	.225	.508	.393	.275
19	29.187	29.002	29.094	29.061	50	66	66	58	88	78	74.0	....	45	.255	.371	.478	.368
20	29.100	29.014	29.092	29.069	61	60	70	72	90	78	80.0	....	68	.429	....	.625	.524
21	29.168	29.149	29.213	29.177	62	65	50	73	88	53	71.3	....	53	.409	.309	.321	.313
22	29.259	29.267	29.252	29.259	49	50	48	64	53	49	55.3	....	49	.176	.321	.329	.275
23	29.151	29.161	29.153	29.155	45	48	48	45	48	49	47.3	....	44	.299	.335	.322	.319
24	29.240	29.216	29.274	29.243	49	61	51	50	65	54	56.3	....	48	.335	.483	.312	.293
25	29.377	29.368	29.389	29.378	56	61	54	58	66	56	60.0	...	48	.422	.470	.391	.42
26	29.502	29.482	29.487	29.457	50	48	52	52	52	49	51.0	....	47	.314	.282	.322	.313
27	29.540	29.489	29.467	29.499	50	52	48	52	56	50	32.7	....	42	.334	.335	.319	.326
28	29.470	29.394	29.362	29.409	50	56	48	54	62	59	58.3	....	39	.308	.349	.309	.329
29	29.252	29.133	29.020	29.135	57	70	62	59	84	70	71.0	....	44	.435	.545	.449	.478
30	28.960	28.875	28.938	28.924	59	65	50	62	73	51	62.0	....	48	.460	.510	.348	.439
31	28.893	29.858	28.903	28.885	47	53	45	48	54	49	50.3	....	46	.310	.389	.247	.315
Means.....	29.322	29.284	29.296	29.301	45.1	49.9	45.7	48.2	57.3	48.6	51.4	....	42.72	.282	.286	.286	.280

of the north and northwestern lakes, at Superior, Wisconsin.

VAPOR.				WIND.									Amount of cloudiness. (10 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, In miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.				7 a. m.	2 p. m.	9 p. m.		
.782	.723	.861	.789	SW......	SW...	SW...	10.6	18.0	20.0	16.2	S. 45 W..		0	0	0	......	....
.792	.244	.864	.633	SW......	W....	W....	3.6	20.0	18.0	13.7	S. 86 W.		3	7	2	......	....
.840	.768	.622	.743	NE......	E	NE....	1.2	6.0	1.2	2.6	N. 78 E..		0	0	0	......	....
.864	.267	.916	.682	W.......	S......	SW....	0.6	8.4	0.3	2.9	S. 5 W..		0	0	10	......	....
.820	.607	.898	.775	NW....	N......	NE....	1.2	2.4	0.3	1.1	N. 10 W..		3	0	7	......	....
.887	.703	.675	.755	NE......	N......	NE....	0.6	9.6	6.2	5.0	N. 18 E..		0	0	0	......	...
.880	.703	.768	.784	E......	NE....	NE....	1.2	6.0	2.4	3.1	N. 50 E..		0	0	0	......	....
.868	.719	.794	.794	E	NE...	NE....	0.3	1.2	3.6	1.6	N. 48 E..		0	0	10	......	....
.898	.493	.750	.714	S........	S......	SW...	2.4	10.0	0.3	4.2	S. 1 W.		10	3	0	......	...
.893	.829	.900	.874	NW......	E.....	NE....	0.6	0.3	13.2	4.4	N. 44 E..		0	10	10	......	...
.898	.636	.782	.772	E.......	E.....	E.....	1.2	4.0	0.3	1.8	East....		10	3	0	......	.30
.850	.820	.685	.785	NE......	NE....	NE....	0.6	2.0	0.3	0.9	N. 45 E..		0	2	0	......	
.895	.661	.703	.753	NE	N......	NE....	0.3	1.5	0.3	0.6	N. 12 E..		10	3	0	......	....
.887	.735	.905	.842	SW......	NE....	E.....	1.0	4.2	0.3	1.1	N. 49 E..		7	3	10	......	....
.900	.669	.903	.824	SW......	SW...	E....	0.6	3.6	1.0	1.2	S. 33 W..		6	5	7	......	....
.900	.756	.903	.853	E	E.....	E	0.3	1.4	2.4	1.4	East....		10	8	3	......	...
.719	.691	.905	.772	N........	E.....	E	0.3	3.6	2.0	1.9	N. 87 E..		0	0	4	......	....
.820	.756	.820	.799	NE......	NE....	SW...	3.0	0.6	0.3	1.1	N. 45 E..		0	10	5	......	....
.900	1.000	1.000	.967	E	NE....	NE ...	4.0	6.0	7.2	4.5	N. 46 E..		10	10	10	......	....
.999	.903	.903	.935	NE......	NE....	NE ...	7.2	8.4	16.4	10.7	N. 45 E..		10	10	10	......	.12
.903	.820	.910	.878	NE......	NE....	NE....	9.6	14.4	7.2	10.4	N. 45 E..		10	10	10	......	....
.907	.750	.905	.854	NE......	NE....	NE....	1.0	4.8	1.0	2.3	N. 45 E..		6	3	0	......	....
.898	.613	.750	.754	SW......	N......	N.....	0.3	1.8	0.3	0.6	N. 6 W..		0	0	0	......	....
.750	.829	.807	.795	S........	NE....	NE ...	1.2	4.8	3.0	2.3	N. 52 E..		0	3	0	......	....
.907	.587	.719	.738	E........	NE....	E.....	2.4	4.0	2.0	2.6	N. 69 E..		0	0	0	......	....
.905	.856	.840	.867	E... ...	NE....	N....	0.3	1.2	0.3	0.5	N. 45 E..		0	0	3	......	....
.820	.329	.777	.642	SW......	N......	NE....	2.4	1.0	0.3	0.5	S. 72 W..		0	0	3	......	....
.907	.907	.903	.906	NE......	NE....	NE....	12.0	9.0	2.0	7.7	N. 45 E..		7	3	2	......	....
.905	.561	.653	.706	SE......	NE....	E.....	1.0	0.6	1.0	0.7	S. 82 E..		0	0	0	......	....
1.900	.606	.753	.756	E	N......	SW...	0.3	1.8	0.3	0.5	N. 4 E..		0	0	0	......	....
.869	.718	.819	.802	....	....	......	....	...	...	1.1	N. 43 E..		3.4	3.1	3.2	......	0.42
.798	.646	.811	.752	SW......	NE ...	NE....	3.0	8.4	20.0	8.5	N. 45 E..		0	7	8	......	....
.898	.898	.898	.898	NE	NE ...	NE....	13.2	18.0	12.0	14.4	N. 45 E..		10	10	10	......	....
.903	.905	.903	.904	NE......	NE ...	NE....	16.0	20.0	18.0	18.0	N. 45 E..		10	10	10	......	....
1.000	1.000	1.000	1.000	NE......	NE....	NE....	8.4	18.0	4.0	10.1	N. 45 E..		10	10	10	......	.20
.905	.820	.895	.873	NE......	NE....	NE ..	14.4	10.0	2.4	8.9	N. 45 E..		5	3	0	......	.80
.800	.515	.750	.688	SE......	NE....	NE....	1.0	1.8	0.3	0.7	N. 71 E..		0	0	0	......	....
.820	.590	.719	710	SW......	E.	N......	0.3	1.8	0.3	0.5	N. 86 E..		0	0	0	.....	....
.798	.470	.590	.586	SW......	W......	W......	3.0	3.0	0.6	2.0	S. 70 W.		10	2	5	......	....
.750	.624	.910	.761	N........	N......	NE....	0.3	1.8	2.4	1.4	N. 24 E..		0	10	10	......	....
.829	.920	.916	.888	NE......	NE....	NE....	2.4	3.6	0.3	2.1	N. 45 E..		10	10	10	......	.10
.900	.631	.820	.784	SW......	NE....	W......	0.3	2.4	0.3	0.7	N. 39 E..		8	10	10	......	....
.829	.234	.727	.597	SW. ...	SW....	W.	2.0	4.0	0.3	2.1	S. 47 W.		5	0	8	......	....
.829	.660	.750	.746	NE ...	NW..	NW...	2.0	3.0	0.3	1.2	N. 14 W.		7	10	3	......	....
.829	.674	.750	.751	SE......	NW...	NE....	0.3	2.4	0.3	0.7	N. 38 W.		0	4	10	......	.05
.907	.856	.861	.841	NE... ..	NE....	NW....	1.2	1.0	2.4	1.0	N. 4 W.		10	0	3	......	.02
.684	.515	.677	.725	NW......	NW...	NW....	2.0	7.2	0.6	3.3	N. 45 W.		8	10	0	......	....
.684	.577	.762	.674	NW....	E.	NE ...	1.0	1.0	0.6	0.4	N. 33 W.		0	0	10	......	....
.698	.265	.816	.593	SW....	SW...	SW....	3.0	15.0	2.6	6.9	S. 45 W..		0	0	7	......	....
.529	.299	.499	.442	SW...	S	SW....	7.2	8.4	3.0	5.7	S. 25 W.		3	0	4	......	....
.539	.....	.653	.596	SW. ..	SW...	S......	3.6	8.4	6.4	5.7	S. 30 W.		0	3	7	.....	....
.504	.233	.798	.512	S.... ..	S......	NW...	3.0	18.0	1.0	6.7	S. 2 W.		0	0	4	......	....
.317	.798	.926	.680	N.......	N......	E.	0.4	1.2	0.3	0.5	N. 11 E..		4	10	10	......	....
1.000	1.000	.926	.975	NE......	NE....	NE....	1.0	2.0	1.0	1.3	N. 45 E..		10	10	10	......	.35
.927	.783	.867	.859	E........	W....	NE....	1.2	3.0	2.0	0.5	N. 16 W.		10	7	7	......	.60
.876	.735	.872	.828	W........	N. ..	E.	0.3	2.0	1.0	0.7	N. 20 E.		6	4	3	......	....
.861	.727	.926	.838	E........	N... ..	N......	1.0	5.4	0.6	2.0	N. 10 E..		0	0	0	......	....
.861	.747	.856	.821	N.......	N... ..	N......	0.6	2.0	0.3	1.0	North. ..		0	0	0	......	....
.738	.665	.856	.753	E	E.... ..	E.	1.0	0.8	0.3	0.7	East.....		0	3	0	.....	....
.878	.468	.613	.653	SE......	SE....	SE ...	0.6	0.3	1.0	0.6	S. 45 E..		0	4	0	......	....
.828	.629	.929	.795	SW......	E.... ..	NE . .	0.3	2.4	3.0	1.5	N. 66 E..		0	4	10	......	....
.927	.933	.710	.857	NE......	NW...	NW...	2.0	0.6	4.8	1.9	N. 23 W.		10	7	6	......	.15
.788	.660	.806	.751	....	....	....	.....	.....	.....	1.5	N. 43 E..		4.4	4.8	5.6	......	22.7

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean..			7 a. m.	2 p. m.	9 p. m.	Mean.
1863					°	°	°	°	°	°	°	°	°				
June 1	28.988	29.074	29.142	29.060	45	52	48	47	59	51	52.3	....	44	.273	.296	.296	.288
2	29.250	29.332	29.372	29.318	47	52	51	49	57	56	54.0	....	45	.297	.322	.308	.309
3	29.407	29.334	29.288	29.343	48	55	50	51	66	54	57.0	....	40	.296	.287	.308	.297
4	29.157	29.197	29.247	29.200	49	59	44	52	62	45	53.0	....	44	.308	.460	.257	.342
5	29.393	29.453	29.543	29.463	43	45	43	45	48	44	45.7	....	40	.251	.260	.264	.258
6	29.720	29.735	29.725	29.727	45	48	44	47	51	46	48.0	...	41	.273	.296	.262	.277
7	29.753	29.707	29.690	29.717	46	48	45	48	52	47	49.0	....	29	.284	.282	.273	.280
8	29.683	29.594	29.517	29.598	47	48	46	49	55	49	51.0	....	35	.297	.243	.271	.270
9	29.451	29.319	29.201	29.324	48	56	58	51	63	65	59.7	....	35	.296	.356	.389	.347
10	29.266	29.185	29.221	29.224	57	65	60	61	76	62	66.3	....	57	.412	.470	.491	.458
11	29.340	29.374	29.367	29.360	52	52	45	52	54	46	50.7	....	45	.388	.362	.286	.345
12	29.416	29.375	29.400	29.397	45	50	49	45	53	51	49.7	....	42	.299	.321	.321	.314
13	29.397	29.349	29.310	29.352	53	58	66	56	64	74	64.7	....	45	.363	.403	.532	.433
14	29.305	29.249	29.241	29.265	66	72	71	75	94	80	83.0	....	61	.519	.488	.637	.548
15	29.458	29.422	29.395	29.425	58	54	47	62	58	48	56.	....	48	.429	.365	.310	.368
16	29.263	29.142	29.158	29.188	42	54	70	46	58	75	09.7	....	45	.215	.365	.666	.415
17	29.321	29.155	29.100	29.192	59	66	59	64	84	72	73.3	....	53	.438	.398	.327	.386
18	29.084	29.119	29.130	29.111	53	51	48	59	60	52	57.0	...	52	.323	.255	.282	.287
19	29.130	29.067	29.170	29.122	46	52	48	48	54	50	50.7	....	47	.284	.302	.309	.318
20	29.210	29.195	29.205	29.203	50	50	52	51	51	53	51.7	...	50	.348	.348	.375	.357
21	29.185	29.230	29.280	29.234	52	56	54	53	58	55	55.3	....	52	.375	.422	.404	.400
22	29.305	29.224	29.367	29.299	51	60	50	52	68	53	57.7	....	46	.361	.411	.321	.364
23	29.450	29.410	29.405	29.422	48	55	50	50	60	52	54.0	....	43	.309	.367	.334	.337
24	29.400	29.245	29.245	29.297	50	64	59	52	81	67	66.3	...	39	.334	369	.393	.365
25	29.311	29.250	29.290	29.284	57	66	70	62	85	75	64.0	....	57	.399	.385	.666	.483
26	29.372	29.252	29.242	29.289	50	50	52	53	52	53	52.7	....	48	.321	.331	.375	.343
27	29.225	29.176	29.189	29.197	50	60	58	52	64	61	59.0	....	49	.334	.543	.443	440
28	29.234	29.211	29.207	29.217	63	61	53	65	65	54	61.3	...	52	.549	.483	.389	.474
29	29.202	29.207	29.180	19.196	50	54	50	54	57	53	54.7	..	52	.308	.378	.321	.336
30	29.180	29.168	29.200	29.183	51	61	55	53	67	57	59.0	....	42	.348	.457	.407	.404
Means.....	29.328	29.285	29.299	29.304	50.7	55.7	53.2	53.5	62.5	56.7	57.6	....	....	.341	.377	.374	.364

of the north and northwestern lakes, at Superior, Wisconsin.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U.S. inches and decimals.	Am't of rain or melted snow, U.S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.847	.592	.790	.743	NW	NW	NW	6.0	8.4	1.0	5.1	N. 45 W.	10	5	6	.053	.07
.853	.692	.687	.744	SW	NE	SW	0.3	3.0	0.6	0.7	N. 45 E.	8	6	3	.086	....
.790	.450	.738	.659	SW	NW	NW	1.0	1.2	3.0	1.4	N. 59 W.	0	8	6	.219	....
.794	.828	.920	.847	E	NE	NE	1.2	3.6	3.0	2.5	N. 52 E.	8	4	10	.110	....
.840	.777	.918	.845	NE	NE	NE	4.0	6.6	3.0	4.5	N. 45 E.	6	0	6	.170	....
.847	.790	.843	.827	NE	NE	NE	0.3	4.8	2.0	2.4	N. 45 E.	0	0	0	.180	....
.850	.727	.847	.808	NE	NE	NE	1.0	3.6	1.0	1.9	N. 45 E.	0	0	7	.200	....
.853	.561	.781	.732	E	NE	NE	0.3	2.0	0.6	0.9	N. 50 E.	0	0	0	.197	....
.790	.619	.631	.680	E	E	W	1.0	2.4	1.0	0.8	East	4	0	10	.223	....
.769	.524	.884	.726	W	SW	SW	0.4	0.6	2.0	0.9	S. 51 W.	10	4	10	.242	....
1.000	.867	.921	.929	NE	E	NE	2 0	1.2	3.0	1.9	N. 53 E.	10	5	10	.048	.13
1.000	.798	.859	.886	NE	N	N	1 0	2.4	1.0	1.4	N. 10 E.	10	0	3	.113	....
.809	.675	.634	.706	NE	NE	SW	0 3	1.0	1.0	0.1	N. 45 E.	0	2	2	.307	....
.599	.306	.623	.509	SW	SE	SW	4.0	15.6	3.0	5.7	S. 21 E.	3	0	0	.540	....
.772	.758	.925	.818	NE	NE	NE	1.0	3.0	4.8	2.9	N. 45 E.	2	0	0	.165	....
.691	.756	.768	.738	NE	NE	SW	3.6	2 0	1.0	1.5	N. 45 E.	0	0	10	.295	....
.727	.342	.417	.495	SW	W	SW	2.0	7.8	4.0	4.3	S. 71 W.	0	0	0	.435	....
.647	.493	.727	.622	W	W	W	3.6	8.4	1.0	4 3	West	10	10	10	.145	....
.850	.867	.836	.858	W	SW	NW	1.0	1.2	0.6	0.7	S. 80 W.	10	10	10	150	....
.929	.929	.932	.930	W	E	W	2.0	1.0	3.0	1.3	West	10	10	6	......	.15
.932	.876	.934	.914	W	E	SE	1.0	3.0	0.6	1.2	S. 83 W.	10	10	10	......	.05
.930	.601	.798	.776	SW	NE	E	0.6	0.3	0.6	0.1	S. 63 E.	0	6	5	......	.112
.856	.708	.861	.808	E	NE	NE	1.0	3.0	1.0	1.6	N. 53 E.	0	3	6	......	.215
.861	.349	.595	.602	E	SW	SW	0 3	7.2	0.6	2.5	S. 43 W.	0	4	0	......	340
.718	.320	.768	.602	SW	SW	SW	7.2	7.8	1.0	5.3	S. 45 W.	0	3	5	.425	....
.798	.861	.932	.864	NE	NE	NE	1.0	1.8	0.3	1.0	N. 45 E.	0	10	6	.095	....
.861	.793	.825	.826	NE	NE	NE	0.6	0.3	0.3	0.4	N. 45 E.	5	6	10	.200	....
.890	.783	.933	.839	N	NE	NE	0.3	2.0	6.0	2.7	N. 44 E.	10	0	10	.090	.02
.738	.812	.798	.783	NE	NE	NE	4.8	2.4	1.0	2.7	N. 45 E.	10	10	0	.081	....
.864	.690	.874	.809	S	N	NE	0.8	1.2	1.0	0.4	N. 33 E.	0	6	3	......	....
.823	.638	.800	.754	....	......	....	....	....	....	0.4	N. 4 E.	4.5	4.0	5.0	5.336	0.32

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.433	29.488	29.451	29.458	58	61.5	59	61	72.5	61	64.8	79	50	.443	.396	.473	.438
2	29.424	29.234	29.055	29.237	55	75.	70	58.	82.	72	70.7	84	52	.393	.773	.706	.624
3	28.957	28.892	28.990	28 946	62	67	60	64.	72.5	61.5	66.0	75	62	.529	.584	.494	.536
4	29.128	29.196	29.261	29 194	57	64	55	61.	66.	58	61.7	68	56	.412	.590	.393	.467
5	29.409	29.428	29.476	29.421	52.5	61	57	54.	70.	60	61.3	79	50	.375	.410	.426	.405
6	29.489	29 391	29.258	29.379	52	68	61	54	72	62	62 7	73	41	.362	.429	.521	.435
7	29.077	29.100	29.188	29.122	....	66	68	70	68	70	69.3	76	59	....	.612	.650	.621
8	29.168	29.077	29.103	29.148	63	57	55	64	60	56	60.0	76	52	.562	.428	.420	.469
9	29.235	29.256	29.196	29 228	56	64.5	58	57	67	61	61.7	69	53	.436	.573	.414	.484
10	29.188	29.087	28.877	29.084	63	72	68	66	81.	75	64.0	86	57	.534	.663	.591	.596
11	28.990	29.193	29.301	29.161	62	62	60	67	69	63	66.3	75	61	.489	.462	.478	.476
12	29.506	29.538	29.388	29.477	55	61	63	57	66	66	63.0	74	55	.407	.470	.536	.471
13	29.348	29.296	29.276	39.306	56	61	64	60	64	66	63.3	70	53	[illegible]	.497	.569	.469
14	29 401	29.431	29.482	29.447	53	64	57	56	57	61	58.0	69	54	[illegible]	....	.412	.387
15	29.487	29.598	29.574	29.553	50	53	52	52	61	54	55.7	74	54	[illegible]	.297	[illegible]	.330
16	29.574	29.341	29.314	29.407	50	61	64	53	66	62	60.3	70	47	[illegible]	.471	....	.402
17	29.276	29.350	29.463	29.361	61	66	59	65	73	64	67.0	74	47	.483	.545	.447	.491
18	29.564	29.480	29.469	29.477	52	64	62	54	69	64	62.3	74	46	.407	.529	.549	.468
19	29.253	29.293	29.388	29.512	61	63	60	64	67	63	64.7	68	56	.497	.522	.478	.499
20	29.441	29.471	29.401	29.439	55	60	61	56	63.5	62	60.5	67	19	.42	.471	.543	.471
21	29.384	29.256	29.123	29.251	53	60	56	55	64.	57	58 7	70	47	.376	.465	.436	.425
22	29.179	29.163	29.256	29.199	55	67	59	56	73.	62	64.0	75	53	.420	.581	.447	.482
23	29.554	29.601	29.572	29.575	52	54	45	55	57	47	53.0	65	47	.349	.378	.273	.366
24	29.463	29.351	29.273	29.362	53	70	70	55	76	73	58.0	82	45	.376	.652	.693	.573
25	29.210	29.200	29.183	29.158	68	71	68	70	74	68	70.7	76	66	.658	.716	.612	.696
26	29.221	29.170	29.218	29.203	63	65	61	64	69	63	65 3	74	60	.562	.564	.510	.545
27	29.286	29.321	29.256	29.291	58	64	63	59	67	65	63.7	75	55	.469	.556	.549	.524
28	29 291	29.323	29.358	29.324	60	66	60	62	73	62	65.7	76	55	.491	.545	.491	.502
29	29.556	29.556	29.517	24.543	49	57	49	51	60	51	54.0	73	47	.321	.426	.321	.356
30	29.500	29.411	29.336	29.415	53	65	59	55	72	62	63.0	76	46	.376	.524	.460	.453
31	29.098	28.980	28.992	29.021	62	67	59	64	71	60	65.0	....	....	.529	.608	.487	.541
Means	29.325	29.304	29.287	29.307	*56.8	*68.9	*59.9	59.3	69.5	62.4	63.3	...	....	*.435	*.505	*.491	.477
Sept. 1	29.342	29.342	29.382	29 355	47	55	39	49	57	41	4.9	51	38	.297	.407	.212	.305
2	29.438	29.342	29.252	29.344	34	53	56	36	59	58	51.0	69	29	.170	.323	.422	.305
3	29.167	29.005	28.832	29.001	53	77	75	55	77	83	71.7	88	46	.376	.678	.760	.604
4	28.967	29.069	29.288	29.108	68	72	61	77	76	64	72.3	84	60	.564	.731	.497	.597
5	29.386	29.431	29.457	29.427	49	48	46	51	56	48	49.7	64	43	.321	.309	.284	.304
6	29.417	29.317	29.262	29.332	49	52	52	50	53.5	54	52.8	64	42	.335	.368	.362	.355
7	29.116	28.953	29.008	29.025	54	63	58	55	66	60	60.3	68	48	.404	.536	.456	.465
8	29.257	29.394	29.457	29.367	52	61	52	55	64	54	57.7	69	50	.349	.497	.362	.402
9	29.420	29.335	29.387	29 379	50	75	58	52	80	63	65.0	80	43	.334	.800	.416	.516
10	29.301	29 255	29.288	29.348	55	68	54	58	78	55	63.7	82	43	.393	.550	.404	.449
11	29.184	29.204	29.387	29.358	51	47	43	52	49	44	48.3	56	40	.361	.297	.864	.307
12	29.672	29.749	29.766	29.729	40	43	38	41.5	45	40	42.1	56	36	.228	.251	.203	.227
13	29 702	29.599	29.481	29.594	38.5	48	48	40.	50	50	46.7	53	33	.213	.309	.309	.277
14	20.422	29.447	29.569	29.479	51.	50	52	52	51	53	52.0	56	45	.361	.348	.375	.361
15	29.695	29.727	29.672	29 697	49.5	52	42	50.5	54	44	51.5	55	39	.341	.391	.241	.326
16	29.557	29.440	29 392	29.363	50.	51	51	51	53	52	52.0	54	34	.348	.348	.361	.352
17	29 116	29.073	29 081	29.090	55	58	52	56	60	54	56.7	69	47	.420	.456	.362	.412
18	29.192	29.326	29.406	29.308	50	54	45	52	57	47	52.0	63	43	.334	.378	.273	.328
19	29.545	29.479	29.382	29.468	40	54	56	42	57	58	52.3	59	35	.221	.378	.422	.340
20	29.420	29.442	29.429	29.427	51	54	47	52	56	49	52.3	65	44	.361	.391	.297	.349
21	29.264	29.010	29.065	29.113	54	75	73	56	59	75	70.0	83	43	.391	.814	.784	.663
22	29.248	29.305	29.299	29.284	55	59	55	59	65	58	60.7	76	54	[illegible]	.420	.393	.397
23	29.354	29.442	29.477	29.427	51	49	43	52	53	45	50.1	60	41	.361	.288	.251	.300
24	29.453	29.364	29.276	29.364	41.5	56	57	43	66	59	56.0	71	37	.243	.316	.439	.334
25	29.133	29.073	29.118	29.108	51.	63	57	56	65	59	60.0	69	48	.308	.549	.439	.432
26	29.141	29.145	29.163	29.149	53	64	57	54	66	60	60.0	66	44	.389	.569	.426	.461
27	29.131	29.982	29.040	29.052	55	75	66	57	79	70	68.7	82	51	.407	.814	.586	.602
28	29.266	29.293	29.436	29.331	53	65	50	55	67	52	58.0	71	48	.376	.591	.334	.433
29	29.545	29.484	29.487	29.505	38	46	50	40	48	52	46.7	58	37	.203	.284	.334	.273
30	29.483	29.420	29.442	29.448	39	56	49	41	54	53	49.3	56	34	.212	.308	.295	.271
Means	20.341	29.315	29.333	29.329	49.2	57.7	52.7	51.0	61.1	55.1	55.9	....	....	.367	.466	.379	.404

* The mean of 30 observations.

of the north and northwestern lakes, at Ontonagon, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1,000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.			
.825	.500	.882	.735	NW	W	Calm	13.2	12.6	0.0	8.0	N. 67° W.	5	2	5	.200	.21
.816	.708	.900	.808	S	S	S	3.0	7.2	3.6	4.6	South	2	2	5	.220	....
.888	.737	.912	.845	S	S	Calm	1.8	1.2	0.0	1.0	South	8	5	5	.045	....
.769	.891	.816	.825	W	W	Calm	1.2	6.6	0.0	2.6	West	8	5	5	.065	.12
.965	.570	.822	.765	Calm	NW	W	0.0	4.8	1.2	1.9	N. 54 W.	2	2	2	.185	....
.867	.539	.942	.782	Calm	S	SE	0.0	3.6	3.0	2.0	S. 20 W.	2	5	8	.235	....
......	.895	.898	.896	S	N	Calm	9.6	3.0	0.0	2.2	South	8	8	8	.020	.21
.943	.822	.935	.900	Calm	NE	N	0.0	12.0	10.8	7.0	N. 24 W.	8	8	8	.040	1.14
.936	.867	.825	.876	Calm	Calm	Calm	0.0	1.0	0.0	0.0	Calm	10	2	5	.110	1.12
.838	.627	.681	.715	S	S	S	3.0	11.4	9.0	7.8	South	5	5	5	.100	....
.749	.653	.831	.741	W	W	W	1.4	12.6	9.0	11.0	West	5	5	5	.180	....
.874	.735	.838	.815	W	N	Calm	0.6	0.6	0.0	0.3	N. 45 W.	5	2	5	.130	...
.575	.833	.891	.766	S	SW	Calm	1.2	4.8	0.0	1.9	S. 34 W.	5	5	8	.040	....
.809	......	.769	.789	N	NW	NW	5.4	12.6	7.2	7.9	N. 35 W.	8	5	5	.145	.31
.861	.553	.867	.760	N	N	N	6.6	1.2	0.6	2.8	North	5	2	5	.105	....
.802	.735	......	.768	S	S	S	11.4	10.8	3.0	8.4	South	5	5	5	.340	....
.783	.672	.776	.743	W	W	W	7.2	12.6	4.8	8.2	West	5	2	5	.080	30
.874	.747	.888	.836	Calm	N	Calm	0.0	3.6	0.0	1.2	North	2	2	5	.120	....
.833	.790	.831	.818	S	W	Calm	1.2	6.6	0.0	2.3	S. 80 W.	5	8	5	.080	....
.935	.805	.942	.894	Calm	N	Calm	0.0	1.2	0.0	0.4	North	8	8	5	.040	....
.869	.780	.936	.861	Calm	N	N	0.0	3.0	3.0	2.0	North	8	5	8	.040	....
.935	.716	.776	.809	SW	SW	SW	6.0	9.0	3.0	6.0	S. 45 W.	5	5	5	.190	.54
.805	.812	.847	.821	NE	NE	NE	10.8	9.6	1.8	7.4	N. 45 E.	2	2	5	.100	....
.869	.727	.854	.814	S	S	S	9.6	7.8	6.0	7.8	South	5	5	8	.180	....
.898	.856	.895	.883	Calm	S	S	0.0	1.2	0.6	0.6	South	8	8	8	.050	....
.943	.796	.886	.875	S	N	NW	1.2	7.2	3.0	2.8	N. 15 W.	5	5	8	.040	.66
.939	.841	.890	.890	Calm	N	Calm	0.0	1.2	0.0	0.4	North	8	8	5	.080	.10
.884	.672	.684	.813	Calm	W	Calm	0.0	5.4	0.0	1.8	West	5	5	5	.130	....
.859	.822	.859	.846	E	E	E	6.0	9.0	3.0	6.2	East	5	5	5	.100	....
.869	.668	.828	.768	S	NW	Calm	1.2	1.2	0.0	0.3	S. 63 W.	2	2	2	.070	....
.888	.802	.940	.876	Calm	W	NW	0.0	1.2	7.2	2.7	N. 51 W.	6	5	5	......	.08
*.888	*.732	*.854	.818	......	......	......	....	....	....	11	S. 78 W.	54	4.6	5.5	......	4.79
.853	.874	.824	.850	N	N	N	9.6	10.8	4.8	8.4	North	5	8	5	......	0.14
.802	.647	.876	.775	Calm	W	S	0.0	1.2	1.2	0.7	S. 45 W.	2	2	5	......	....
.867	.731	.673	.757	S	S	S	1.8	7.2	13.2	7.4	South	5	5	5	......	....
.808	.815	.833	.752	S	S	SW	6.6	15.0	6.6	9.0	S. 36 W.	2	5	5	......	...
.859	.856	.850	.855	NE	NE	NE	12.6	13.2	10.8	12.2	N. 45 E.	7	7	7	......	....
.927	.899	.867	.897	E	NE	Calm	4.8	1.2	0.0	1.9	N. 82 E.	8	8	8	......	....
.934	.838	.880	.884	Calm	S	S	0.0	4.8	1.8	2.2	South	8	6	5	......	....
.805	.833	.867	.835	W	W	W	16.8	15.6	1.8	11.4	West	5	5	5	......	....
.861	.782	.723	.788	S	S	Calm	7.2	9.0	0.0	5.4	South	2	5	2	......	....
.816	.574	.934	.974	S	NW	Calm	3.0	1.2	0.0	0.8	S. 20 W.	5	5	8	......	....
.930	.853	.918	.900	N	N	N	10.8	12.0	12.6	11.8	North	8	8	8	......	1.08
.869	.840	.820	.843	N	N	N	10.8	4.8	3.0	6.2	North	8	5	5	......	....
.864	.856	.856	.858	S	S	S	3.0	1.8	1.2	2.0	South	8	8	8	......	0.20
.930	.929	.932	.930	Calm	Calm	Calm	0.0	0.0	0.0	0.0	Calm	8	8	6	......	....
.928	.872	.836	.878	NE	NE	N	3.0	3.6	1.2	2.5	N. 38 E.	8	5	5	......	1.15
.929	.864	.930	907	Calm	S	E	0.0	3.0	1.2	1.1	S. 22 E.	5	8	8	......	....
.935	.880	.867	.894	Calm	W	Calm	0.0	1.2	0.0	0.4	West	6	5	8	......	0.32
.861	.812	.847	.940	NW	NW	NW	9.0	7.2	1.2	5.8	N. 45 W.	5	5	5	......	....
.829	.812	.876	.839	Calm	N	Calm	0.0	1.2	0.0	0.4	North	5	7	7	......	....
.930	.872	.853	.885	Calm	N	N	0.0	1.2	0.6	0.6	North	8	7	5	......	....
.872	.822	.904	.866	S	S	S	9.0	15.0	13.8	12.6	South	5	5	5	......	....
.761	.680	.816	.752	W	W	Calm	4.8	1.8	0.0	2.2	West	5	2	5	......	..
.930	.702	.840	.824	N	N	W	6.6	10.8	5.4	6.0	N. 17 W.	6	5	2	.....	0.21
874	.495	.878	.749	S	SW	SW	6.0	13.2	10.8	9.5	S. 36 W.	5	0	6	......	...
.687	.890	.878	.785	SW	SW	Calm	9.0	7.8	0.0	5.6	S. 45 W.	5	5	5	......	....
.933	.891	.822	.882	Calm	E	N	0.0	1.2	1.2	0.7	N. 45 W.	5	2	5	......	....
.874	.822	.799	.831	S	S	S	5.4	15.0	10.8	10.4	South	2	2	5	......	....
.869	.893	861	.841	NW	NW	NW	7.2	10.8	9.0	9.0	N. 45 W.	5	5	7	......	....
.820	.850	.861	.843	E	NE	NE	6.6	12.6	10.8	9.3	N. 55 E.	7	5	8	......	....
.821	738	.733	.765	Calm	E	Calm	0.0	5.4	0.0	1.8	East	6	6	6	......	0.30
.859	801	[illegible]	.829	......	......	......	....	....	....	0.6	S. 88 W.	5.6	5.3	5.4	......	3.40

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air				Maximum.	Minimum.		Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Oct. 1	29.488	29.220	29.116	99.274	57	53	59	59	55	62	58.7	65	39	.439	.376	.460	.425
2	29.276	29.328	29.366	29.323	53	55	50	55	66	52	57.7	69	48	.376	.267	.331	.332
3	29.512	28.992	28.977	29.060	54	66	54	57	71	56	61.3	74	44	.378	.572	.391	.447
4	29.070	29.376	29.487	29.277	48	46	48	49	51	50	50.0	54	38	.322	.245	.309	.292
5	29.625	29.499	29.114	29 412	39	60	50	40	63	53	52.0	62	30	.225	.478	.321	.341
6	28.951	28.781	28.951	28.894	56	60	52	58	62	53	57.7	64	42	.422	.491	.375	.429
7	28.918	28.716	28.708	28.780	48	56	56	44	57	57	54.3	64	42	.322	.436	.452	.403
8	28.758	28.918	29.230	28 978	50	52	49	32	54	51	52 3	64	41	.334	.362	.321	.439
9	29.415	29.407	29.457	29.426	36	54	48	38	56	50	48.	63	31	.186	.391	.309	.295
10	25.585	29.615	29.635	29.611	42	42	36	43	42	38	41.0	48	32	.254	.267	.186	.235
11	29.588	29.490	29.360	29.479	31	44	39	33	50	40	44.0	50	27	.151	.209	.225	.195
12	29.170	29.038	29.113	29.107	40	64	51	45	66	54	55.0	67	35	.182	.569	.378	.376
13	29.180	29.348	29.412	29.313	43	42	40	44	43	42	43.0	55	40	.264	.241	.221	.242
14	29.668	29.683	28.654	29 669	35	34.5	32	36	37.5	34	38.8	38	30	.199	.161	.170	.176
15	29.535	29.385	29.288	29.409	27	40.	38	28	43	40	37.0	45	19	.142	.208	.203	.184
16	29.094	29.218	29.398	29.237	42.5	42	39	44	45	41	43.3	45	31	.252	.228	.212	.230
17	29.466	29.390	29.270	29.375	46.	45	43	38	49	46	44.3	50	33	.186	.247	.238	.223
18	29.031	29.056	29.235	29.107	48	53	44	50	58	46	51.3	63	41	.309	.333	.262	.302
19	29.568	29.321	29.537	29.482	35	42	32	37	45	34	38.7	48	30	.178	.228	.155	.187
20	29.074	28.751	28.764	28 863	42	47	46	40	54	48	47.3	55	29	....	.231	.284	.257
21	28.821	28.819	28.956	28.865	47	43	38	48	48	41	45.7	51	38	.303	.269	.190	.254
22	29.282	29.388	29.441	29.370	37	35	35	38	39	38	38.7	43	34	.207	.152	.163	.174
23	29.553	29.336	29.400	29.429	32	38	32	34	40	35	36.3	42	29	.155	.203	.142	.166
24	29.255	29.436	29.706	29 465	34	29	26	37	31	29	32.3	38	20	.157	.137	.106	.133
25	29.963	29.929	29.684	29.857	23	30	21	25	32	24	27.0	34	19	.100	144	.079	.107
26	29.324	29.232	29.284	29.280	36	37	28	28	39	31	32.7	41	19	...	.194	.119	.156
27	29.251	29.232	29.197	29.226	32	36	34.5	33	38	36	35.7	39	26	.168	.186	.180	.178
28	29.214	29.198	29.301	29.237	34	35	31.	35	36.5	33	34.8	41	30	.183	.184	.151	.172
29	20.381	29.354	29.187	29.307	35	42	44	36	45	47	42.7	47	32	.191	.228	249	.222
30	29.054	29.105	29.184	29.114	44	52	42	46	56	44	48.3	57	32	.262	.335	.241	.279
31	28 995	29.212	29.455	29.210	36	34	31.5	37	36	33.5	35.5	40	28	.199	.170	.154	.174
Means	29.273	29.251	29.295	29.276	*41.4	45.4	40.9	42.2	48.6	43.1	44.6	....	....	*.243	.296	.244	.216
Nov. 1	29.424	29.406	29.432	29.354	32	32	30	37	34	32	32.3	36	22	.144	.155	.138	.145
2	29.305	29.275	29.151	29.243	31	32	24	32	34	27.5	31 1	37	20	.162	.155	.089	.142
3	29.438	29.474	29.330	29.414	32	36	36	31	41	38.	37.7	41	28	.155	.147	.186	.162
4	29.175	29.186	29.395	29.252	37	40	35	38	44	37.5	39.8	41	29	.207	.195	.171	.191
5	29.534	29.577	29.538	29.549	34	32	24	36	34	25.	31.7	38	20	.170	.155	.117	.147
6	29.070	29.048	29.455	29.191	27	32.5	30	31	35	32.	32.7	37	20	.101	.152	.144	.135
7	29.578	29.531	29.500	29.536	19	42.	30	21	45	32.	32.7	45	15	.080	.228	.144	.150
8	29.438	29.378	29.456	29.420	27	42	24	29	48	27	34.3	49	20	.124	.189	.095	.136
9	29.644	29.658	29.667	29.656	22	40	32	24	43	35	34.0	49	17	.095	.208	.142	.148
10	29.614	29.456	29.014	29.361	29	34	28	31	37	28	32.0	38	19	.137	.157	.117	.137
11	28.955	29.072	29.182	29.069	37	31	26	39	33	29	33.7	43	23	.194	.151	.106	.150
12	29.388	29.337	29 417	29.380	20	24	20	22	26	23	23.7	30	14	.085	.106	.074	.088
13	29.525	29.489	29.574	29.529	16.5	18	18	19	21	20	20.0	30	13	.063	.065	076	.068
14	29.761	29.894	29.984	29.849	14.5	15	14	17	17	16	16.7	25	10	.056	.063	.059	.059
15	30.043	29.985	29.859	29.968	7	27	24	95	29	26	21.5	30	2	.031	.124	.106	.087
16	29.815	29.670	29.664	29.716	25	34	30	28	37	32	32.3	37	18	.100	.157	.144	.133
17	29.669	29.694	29.640	29 667	20	33	22	23	41	24	29.3	44	16	.074	.190	.095	.119
18	29.496	29.408	29.360	29.421	24.5	37	35	26	39	37	34.0	42	13	.115	.194	.178	.162
19	29.425	29.388	29.255	29.356	31.5	3 .5	28	33.5	34	30	32.5	37	25	.154	.130	.153	.145
20	29.455	29.410	29.362	29.409	27.	28.	21	29	39	24	27.7	31	13	.124	.130	.079	.111
21	29.165	29.156	29.261	29 194	19.	41.	34	21	43	37	33.7	45	15	.080	.231	.157	.156
22	29.546	29.646	29.637	29.609	29.5	24	18	31	26	20	25.7	38	16	.146	.106	.076	.109
23	29.604	29.331	29.206	29.380	20	32	31	23	34	34	30.3	38	18	.074	.155	.139	.122
24	28.992	28.961	29.073	29.008	28	34	28	31	35	31	32.3	26	20	.119	.183	.119	.140
25	29.367	29.381	29.396	29.381	22	23	23	24	25	26	25.0	27	18	.095	.100	.089	.094
26	29.298	29.172	28 118	29.196	12	30	18	14	32 5	20	22.3	33	8	.052	.138	076	.085
27	29.032	29.033	29.018	29.024	23	30	17	25	31.	20	25.3	32	12	.100	.155	.060	.105
28	28.962	28.888	28.980	28.943	23	24	20	25	26	23	34.7	27	16	.100	.106	.074	.098
29	29.063	......	29.155	29.109	20	..	20	22	..	22	22.0	26	10	.085	....	.085	.085
30	29.256	29.274	29.405	29.311	21	27	25	22	29	26	25.7	29	15	.085	.124	.123	.110
Means.....	29.401	*29.385	29.383	29.389	24.2	*32.1	25.4	26.4	*34.5	27.7	29.2	...	....	.110	*.146	.114	.124

*** The means of 29 observations.**

of the north and northwestern lakes, at Ontonagon, Michigan.

VAPOR. Humidity. Saturation = 1.000. 7 a. m.	2 p. m.	9 p. m.	Mean.	WIND. Direction—from whence. 7 a. m.	2 p. m.	9 p. m.	Velocity, in miles per hour. 7 a. m.	2 p. m.	9 p. m.	Resultant velocity, in miles per hour.	Resultant direction.	Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.) 7 a. m.	2 p. m.	9 p. m.	Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
.878	.869	.828	.858	S.........	S......	S	3.0	5.4	7.2	5.2	South ...	6	2	5	......	
.869	.450	.861	.760	S..	W......	Calm..	0.6	10.8	0.0	3.6	S. 87 W.	2	2	5	......	....
.812	.754	.872	.812	S	S......	S	11.4	12.6	7.7	10.4	South ...	8	5	8	......	....
.926	.653	.856	.811	NW......	NW...	NW....	19.2	18.6	12.6	16.8	N. 45 W.	8	5	5	......	.46
.910	.831	.798	.846	S.........	S	S	1.8	3.0	1.8	2.2	South ...	5	2	5	......	....
.876	.884	.932	.897	S.........	S.......	Calm..	1.2	1.8	0.0	1.0	South ...	5	6	8	......	.34
.926	.916	.937	.933	S	S	S	1.2	0.6	0.6	0.8	South ...	5	8	8	......	.10
.861	.867	.859	.862	W.........	W. ...	W......	15.0	15.6	11.4	14.0	West..	6	6	5	......	54
.811	.872	.856	.849	S	NW...	NW...	0.6	9.0	4.8	4.5	N. 47 W.	5	5	5	......	....
.916	1.000	.811	.909	NW.	N.	N.	5.4	7.8	1.2	4.4	N. 17 W.	6	6	5	......	14
.800	.581	.910	.763	S	S	S	3.0	7.2	3.0	4.4	South ...	5	2	5	......	....
.607	.891	.812	.770	S	S	S	13.8	15.0	7.2	12.0	South ...	5	5	5	......	....
.918	.836	.829	.861	N.	NE....	N.	15.0	9.0	6.0	9.3	N. 13 E..	8	6	6	......	....
.903	.715	.802	.806	N.	N.	N.	13.8	10.8	7.2	10.0	North ...	6	6	5	......	....
.887	.759	.820	.819	S.........	SW. ..	SW...	1.2	13.2	7.2	7.0	S. 43 E..	6	6	6	......	31
.876	.762	.824	.820	NW......	NW....	NW. ..	15.6	15.0	14.8	15.0	N. 45 W.	6	6	8	......	....
.811	.710	.767	.762	S.... ...	S.......	4	13.2	13.8	12.6	13.2	South ...	6	6	6	......	....
.856	.698	.843	.799	S.........	W......	NW. ..	15.0	15.6	17.4	9.3	S. 84 W.	6	6	6	......	....
.807	.762	.792	.787	N.	N.	N.	19.2	12.6	13.0	11.6	North ...	6	6	6	......	....
.....	.552	.850	.701	S.... ...	S.......	S	7.8	12.6	7.2	9.2	South ...	6	5	5	......	....
.888	.667	.738	.764	W.........	NW. ..	NW. ..	15.0	16.8	21.0	16.3	N. 57 W.	5	6	8	......	....
.915	.635	.719	.753	NW......	NW. ..	NW. ..	16.8	16.8	15.0	16.2	N. 45 W.	6	6	6	......	....
.792	.823	.698	.770	S	S	S	3.0	9.0	7.8	6.6	South ...	6	6	6	......	....
.712	.788	.665	.721	NW.	NW....	NW. ..	21.0	25.2	22.8	23.0	N. 45 W.	6	6	6	......	....
.746	.794	.610	.716	N.	NW....	W.......	7.2	7.8	3.6	5.2	N. 36 W.	6	6	6	......	....
.....	.816	.685	.750	SW.	SW. ..	W.	7.2	9.0	7.8	7.5	S. 61 W.	6	6	3	......	....
.893	.811	.851	.851	Calm	S	S	0.0	1.8	1.2	1.0	South ...	6	6	8	......	....
.898	.853	.800	.850	Calm.....	Calm..	Calm..	0.0	0.0	0.0	0.0	Calm....	8	6	6	......	.18
.900	.762	.772	.811	Calm	S	S.......	0.0	7.2	9.0	5.4	South ...	2	5	5	......	....
.843	.747	.836	.808	Calm	W......	Calm..	0.0	4.8	0.0	1.6	West....	2	2	6	......	....
.903	.802	.803	.835	E.	N.	N.	4.8	13.2	10.8	8.3	N. 11 E..	5	6	6	......	....
*.818	.769	.807	.807	....	....	....	....	....	....	3.6	N. 75 W..	5.6	5.5	5.9	......	2.07
.794	.792	.748	.778	E........	NE....	NE....	10.8	3.0	4.8	5.7	N. 71 E..	6	8	6	......	....
.896	.792	.593	.760	SW......	W.....	Calm..	5.4	9.0	0.0	4.3	S. 74 W.	6	6	6	......	....
.792	.567	.811	.723	NW.....	NW....	....	13.8	3.0	...	8.4	N. 45 W.	6	6	6	......	....
.905	.677	.762	.781	S.........	W	NW...	1.2	1.8	7.2	2.7	N. 61 W.	6	5	5	......	....
.802	.792	.872	.822	N.	N......	N	13.2	13.0	9.0	11.7	North...	5	5	2	......	....
.582	.747	.794	.707	S.	S......	E.... .	10.8	3.0	9.0	5.5	S. 33 E..	5	8	5	......	....
.712	.762	.794	.756	S.	S......	S	7.8	7.2	4.8	6.6	South....	2	2	5	......	18
.775	.563	.644	.660	S.	S.. ...	Calm..	3.0	1.2	0.0	1.4	South....	5	2	2	......	....
.738	.750	.698	.728	S.	Calm ..	Calm..	1.8	0.0	0.0	0.6	South....	2	5	5	......	....
.788	.712	.768	.756	NE.......	NE	Calm..	6.6	1.2	0.0	2.6	N. 45 E..	6	5	6	......	....
.816	.800	.665	.760	NW	NW...	NW...	15.0	16.8	15.0	15.6	N. 45 W.	6	6	6	......	....
.721	.754	.598	.691	SW......	W....	W......	1.2	10.8	15.0	8.8	S. 88 W.	5	6	8	......	....
.617	.570	.702	.629	W.........	SW....	S	7.2	1.2	1.2	2.7	S. 76 W.	6	8	6	......	....
.589	.671	.659	.606	N...	W......	W......	16.8	11.4	1.8	7.1	N. 38 W..	6	6	6	......	....
.470	.775	.754	.666	S...	S	S.......	7.2	1.8	1.2	3.4	South....	6	5	6	......	....
.655	.712	.794	.720	S...	S.......	Calm..	0.6	0.6	0.0	0.4	South....	8	6	6	......	....
.598	.738	.738	.688	SW......	NW...	S	7.2	5.4	1.2	3.0	S. 74 W..	6	5	5	......	....
.815	.816	.807	.812	S.	W......	W.. ..	3.0	13.8	12.6	8.8	S. 83 W..	6	6	6	......	....
.803	.664	.844	.770	NW......	N.	SW. ..	11.4	9.0	3.0	6.0	N. 35 W.	6	6	8	......	....
.775	.782	.610	.722	N.........	N.	Calm..	12.6	7.2	0.0	6.6	North. ..	6	5	5	......	....
.712	.833	.712	.752	S.	W......	NW....	7.2	12.6	13.2	7.3	N. 84 W.	5	2	5	......	....
.811	.754	.702	.765	N.	N.	N.	13.8	9.0	1.2	8.0	North....	6	6	6	......	....
.598	.792	.712	.700	S.	S.......	S	7.2	15.0	3.0	8.4	South....	5	5	5	......	....
.685	.898	.685	.756	S.	S.......	N.	1.2	1.2	9.0	2.2	North. ..	6	8	8	......	....
.738	.746	.634	.706	N.........	N......	N.......	15.0	12.6	4.8	10.8	North ..	8	6	6	......	....
.635	.748	.702	.695	S.	S.......	S.......	3.0	4.8	3.0	3.6	South. ..	5	5	8	......	....
.746	.893	.556	.731	Calm.....	N.	N.......	0.0	21.0	7.2	9.4	North....	8	8	8	......	.20
.746	.754	.598	.699	Calm.....	N......	N.......	0.0	5.4	1.2	2.2	North. ..	6	6	6	......	....
.721	.....	.721	.721	S.........	....	S	6.6	....	1.2	3.9	South ...	6	....	5	......	....
.721	.775	.876	.790	S.........	SE...	NE ...	3.0	3.0	13.2	4.0	N. 69 E..	6	8	8	......	.10
.726	*.745	.718	.761	....	....	....	....	....	....	2.2	N. 44 W.	5.7	5.6	5.8	......	.48

* The means of 29 observations.

K—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.579	22.623	29.674	29.630	21	27	17	22	29	20	23.7	89	1	.10	.124	.062	.093
2	29.515	29.584	29.277	29.392	13	20	15	14	21	17	17.3	22	6	.052	.095	.063	.070
3	29.286	29.287	29.325	29.299	20	16	10	22	19	12	17.7	22	6	.085	.056	.046	.062
4	29.371	29.230	29.245	29.252	9	11	18	11	13	20	14.7	22	4	.043	.049	.076	.056
5	29.163	29.270	29.417	29.283	12.5	12	8	15	14	10	13.0	22	8	.047	.052	.040	.046
6	29.564	29.555	29.592	29.571	5	....	6.5	7	5	11	77.	15	4	.032		.037	.039
7	29.616	29.500	29.404	29.473	4	8.5	6	6	11	8	83	16	3	.031	.035	.034	.033
8	29.270	29.331	29.367	29.322	13	2.4	13	15	27	15	19.0	31	7	.056	.092	.056	.068
9	29.411	29.301	29.317	29.343	22.5	3.6	2.8	25	39	30	31.3	42	13	.091	.17	.130	.14
10	29.255	28.918	28.919	29.040	20	41	19	20	41	21	28.3	45	19	.108	[illegible]	.080	.133
11	29.022	29.133	29.242	29.089	27	32	28	29.5	35	30	31.5	36	22	.118	.142	.130	.130
12	29.342	....	29.058	29.097	26	..	28	24	....	3	29.5	37	23	.117	...	.119	.118
13	28.853	28.790	29.085	28.910	36	45	36	40	48	38	42.0	49	23	.165	.260	.188	.168
14	29.157	29.000	28.864	29.008	31	32	30	32	35	32	33.0	39	27	.162	.142	.114	.149
15	29.050	29.008	28.992	29.017	26	27	27	27	28.5	28	27.8	32	20	.129	.130	.136	.131
16	29.160	29.250	29.405	29.271	21.5	....	19	23	27	21.5	23.8	30	14	.085	...	.075	.080
17	29.715	29.736	29.455	29.636	19	24	23	21	26	26	21.3	27	13	.080	.106	.089	.091
18	29.180	29.080	29.314	29.154	27	37	20	29	40	22	30.3	40	12	.121	.181	.085	.130
19	29.991	30.017	30.009	30.005	8	13	....	10	14	2	12.	22	9	.040	.067	...	.052
20	29.940	29.753	29.516	29.734	....	21	22	5	23	24	23.5	27	13	...	.094	.095	.092
21	29.369	29.315	29.286	29.300	21.5	29	20	26	31	23	26.7	33	17	.115	.137	.074	.108
22	29.325	29.373	29.532	29.410	10	30	26	12	31	28	23.7	34	6	.046	.155	.117	.106
23	29.572	29.492	29.161	29.208	22	25	28	23	27	30	26.7	34	13	.107	.112	.130	.110
24	28.937	28.867	28.905	28.873	33	37	31	35	39	32	25.3	40	15	.162	.194	.111	.160
25	29.180	29.136	29.092	29.137	29	34	22	31	37	25	31.0	38	20	.137	.157	.084	.126
26	29.018	29.040	29.067	29.041	11	36	30	13	38	33	28.0	39	11	.049	.186	.132	.122
27	29.166	29.070	28.962	29.073	28	28.5	23	22	30	25	25.7	34	21	.085	.145	.104	.110
28	28.960	28.937	29.080	28.996	19	27	31	21	30	33	28.	33	15	.080	.113	.151	.114
29	29.355	29.433	29.496	29.427	22	31	21	21	33	24	27.0	31	16	.095	.151	.074	.805
30	29.515	29.464	29.402	29.460	12	30	12	15	32	14	20.3	34	8	.041	.144	.052	.079
31	29.261	29.161	29.166	29.203	19	35	....	21	38	30.5	29.8	39	8	.080	.165	...	.092
Means.....	29.324	*29.283	29.279	29.279	*19.4	‡26.5	†21.2	20.4	*29.8	22.9	24.2	....	...	*.088	‡.127	†.093	.100
1863.																	
January 1	29.207	29.695	28.952	29.084	26	37	29	29	40	33	34.0	42	23	.106	.181	.114	.133
2	28.742	28.767	28.769	28.759	35	38	34.5	38	40	37	38.0	41	27	.155	.203	.180	.182
3	28.932	28.909	28.864	28.902	30	37	31.	31	39	31	34.7	39	29	.155	.194	.139	.162
4	28.832	28.816	28.827	28.825	24	26	24.	26	28	26	26.7	29	20	.103	.117	.106	.109
5	28.892	28.935	29.047	28.958	22	23	12.	24	25	14	21.0	30	19	.095	.100	.052	.082
6	29.148	29.245	29.424	29.272	10	14	8.	12	16	10	12.7	19	7	.048	.059	.040	.048
7	29.445	24.514	29.559	29.503	9	13	8.	11	15	11	12.3	17	5	.043	.056	.028	.042
8	29.594	29.538	29.491	29.541	0	20	3	0	23	4	9.0	26	— 7	.043	.074	.038	.051
9	29.438	29.241	28.998	29.225	11	26	24	13	28.5	25	22.1	30	— 8	.049	.112	.117	.049
10	28.848	28.842	29.003	28.897	26	22	18	28	24.	20	24.	27	11	.117	.106	.076	.099
11	29.198	29.296	29.298	29.264	13	19	12	16	21	14	17.0	21	7	.044	.080	.052	.058
12	29.296	29.438	29.558	29.427	25	23	19	28	25	21	24.7	29	7	.100	.100	.080	.093
13	29.487	....	28.716	29.604	20	..	30	22	....	33	27.5	34	14	.087	...	.132	.108
14	88.949	28.976	29.226	29.050	14	15	10	17	17	12	15.3	34	9	.048	.063	.046	.052
15	29.577	29.400	26.567	29.448	10	7	7	12	9	9	10.0	16	1	.046	.037	.037	.036
16	29.468	29.336	29.374	29.392	3	7	4	4	9	6	6.3	10	— 6	.038	.037	.030	.035
17	27.548	29.491	29.495	29.511	1.5	14	14	35	17	16	12.7	21	— 3	.029	.048	.059	.045
18	29.422	29.451	29.524	29.465	13	23	27	16	26	29	23.7	30	10	.014	[illegible]	.124	.085
19	29.712	29.789	29.654	29.718	22		23	21	23	21	21.7	24	17	.095	....	.112	.103
20	29.463	29.458	28.459	29.460	29	32	31	30	36	32	32.7	32	18	.149	.129	.164	.146
21	28.580	29.426	29.402	29.469	28	32	31.5	29	35	33	32.3	36	22	.142	.142	.160	.148
22	29.308	28.313	29.488	29.369	31	34	25.	32	35	27	31.3	34	21	.162	.187	.112	.152
23	29.496	29.461	29.188	29.348	20	27	27.5	22	29	29	27.0	79	16	.085	.124	.133	.112
24	29.000	29.122	29.198	29.106	31	32	28.	32	34	30	32.	36	21	.162	.155	[illegible]	.149
25	29.422	29.433	29.461	29.459	17	38	22	19	40	24	27.7	42	12	.071	.213	.097	.123
26	29.495	20.480	29.481	29.452	18	20	19	20	22	21	21.1	29	10	.076	.087	.080	.080
27	29.575	29.532	29.415	29.507	17.5	21	16	20	22	18	21.0	26	21	.068	.101	.067	.078
28	29.207	29.180	29.025	29.137	14	32	26	16	37	29	27.3	40	9	.059	.116	.106	.090
29	28.915	28.900	29.116	28.977	24	28	24	26	31	27	28.0	31	15	.106	.119	.093	.106
30	29.373	29.317	29.148	29.279	20	28	22	22	30	24	25.3	34	14	.085	.130	.095	.103
31	29.293	29.301	29.190	29.261	8	12	9	10	13	10	11.0	5	4	.040	.063	.054	.053
Means.....	29.263	*29.200	29.255	19.213	18.6	†24.1	19.9	20.4	*26.3	21.9	22.9		....	.082	†.110	.091	.095

†The means of 29 observations. *The means of 30 observations. ‡The means of 28 observations.

of the north and northwestern lakes, at Ontonagon, Michigan.

VAPOR.				WIND.													
Humidity. Saturation = 1 000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.	Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.860	.775	.556	.730	N.	N.	N.	9.0	9.6	7.2	8.6	North.	8	6	6	......	....
.635	.855	.671	.720	S.	S.	S.	3.0	3.6	3.0	3.2	South.	6	8	8	......	....
.721	.541	.610	.624	N.	N.	N.	13.8	15.0	13.2	14.0	North.	8	8	5	......	....
.596	.623	.702	.640	S.	S.	W.	7.2	7.8	10.8	6.2	S. 31 W.	8	8	6	......	....
.562	.635	.582	.593	W.	SW.	N.	10.8	7.2	15.0	6.2	N. 56 W.	6	8	5	......	.192
.858	......	.150	.244	N.	N.	N.	15.6	3.6	10.8	10.0	North.	6	6	6	......	....
.520	.496	.553	.523	S.	S.	S.	9.0	3.0	1.8	4.6	South.	5	6	6	......	....
.648	.644	.648	.646	S.	W.	S.	3.6	9.6	9.0	5.3	S. 37 W.	6	6	6	......	....
.684	.726	.782	.730	S.	W.	W.	1.8	7.2	3.6	3.7	S. 81 W.	2	1	5	......	....
1.000	.756	.712	.822	S.	S.	S.	3.0	0.6	1.2	1.6	South.	2	5	2	......	....
.725	.698	.782	.735	W.	NW.	N.	7.2	6.6	4.8	5.0	N. 51 W.	6	6	6	......	....
.768	......	.685	.727	S.	......	S.	1.2	....	3.0	2.1	South.	6	....	6	......	....
.645	.777	.811	.744	S.	S.	SW.	7.2	6.6	7.2	6.5	S. 15 W.	6	6	6	......	....
.896	.698	.794	.796	W.	W.	W.	1.8	1.2	1.8	1.6	West.	6	6	6	......	....
.880	.829	.863	.864	SW.	W.	N.	3.6	4.8	3.6	2.5	N. 81 W.	6	6	6	......	....
.674	......	.647	.660	N.	N.	N.	15.0	9.6	13.8	12.8	North.	6	6	6	......	.108
.712	.754	.634	.700	S.	S.	NW.	3.0	1.8	3.0	1.2	S. 38 W.	5	5	6	......	....
.775	.732	.721	.742	S.	W.	N.	12.6	11.4	7.2	4.3	S. 65 W.	5	5	6	......	....
.582	.816	......	.704	N.	N.	Calm.	4.8	1.2	0.0	2.0	North.	6	6	2	......	....
......	.730	.738	.724	S.	S.	S.	0.6	7.2	4.8	4.2	South.	2	6	6	......	....
.815	.788	.598	.733	SW.	W.	W.	6.0	7.8	3.0	5.3	S. 71 W.	6	6	6	......	....
.610	.893	.768	.757	S.	NW.	NW.	3.6	7.2	1.2	2.0	N. 69 W.	5	6	5	......	....
.864	.761	.782	.805	W.	S.	W.	1.2	1.8	1.2	1.0	S. 53 W.	6	6	6	......	....
.797	.816	.794	.802	S.	SW.	W.	6.6	1.8	7.2	3.8	S. 47 W.	6	6	6	......	....
.788	.712	.622	.707	W.	NW.	W.	13.8	1.8	1.2	5.4	N. 86 W.	5	2	5	......	....
.623	.811	.703	.712	Calm.	Calm.	Calm.	0.0	0.0	0.0	0.0	Calm.	2	5	6	......	....
.721	.888	.746	.785	S.	SW.	S.	1.2	0.6	1.2	0.9	S. 8 W.	6	6	2	......	....
.712	.675	.800	.729	Calm.	Calm.	W.	0.0	0.0	1.8	0.6	West.	5	8	6	......	....
.738	.800	.610	.716	NW.	NW.	NW.	13.2	9.0	3.0	8.4	N. 45 W.	6	6	6	......	.25
.475	.794	.635	.601	S.	S.	Calm.	4.8	1.2	0.0	2.0	South.	5	5	2	......	....
.712	.719	......	.715	Calm.	S.	S.	0.0	13.8	15.6	9.8	South.	2	5	5	......	....
* .709	‡ .746	† .679	.700	......	......	......	....	...	....	1.7	N. 79 W.	5.2	5.8	5.3	......	.325
.665	.732	.606	.667	S.	S.	Calm.	7.2	3.0	0.0	3.4	South.	5	5	5	......	....
.719	.820	.851	.796	Calm.	Calm.	Calm.	0.0	0.0	0.0	0.0	Calm.	6	6	6	......	....
.893	.816	.712	.807	Calm.	Calm.	Calm.	0.0	0.0	0.0	0.0	Calm.	5	6	8	......	.40
.754	.768	.754	.758	SW.	W.	W.	7.2	12.6	10.8	9.7	S. 80 W.	6	6	6	......	....
.738	.746	.635	.706	SW.	SW.	W.	7.2	13.8	21.0	12.8	S. 67 W	5	5	8	......	....
.610	.659	.582	.613	NW.	NW.	N.	16.8	12.6	10.8	12.7	N. 33 W.	6	6	5	......	....
.596	.618	.398	.547	S.	W.	W.	3.0	3.6	1.8	2.1	S. 61 W.	6	6	6	......	....
1.000	.598	.740	.779	Calm.	Calm.	Calm.	0.0	0.0	0.0	0.0	Calm.	2	2	2	......	....
.623	.716	.872	.737	Calm.	S.	NW.	0.0	7.8	6.0	1.8	S. 50 W.	5	6	6	......	....
.768	.754	.702	.708	NW.	NW.	NW.	15.0	16.2	13.8	15.0	N. 45 W.	6	6	6	......	....
.492	.712	.635	.613	W.	W.	Calm.	3.0	0.6	0.0	1.2	West.	6	5	6	......	....
.665	.746	.712	.707	NW.	NW.	Calm.	15.0	9.0	0.0	8.0	N. 45 W.	6	6	6	......	....
.721	......	.703	.712	S.	......	E.	3.0	....	4.8	1.9	S. 58 E.	6		6	......	....
.509	.671	.610	.596	W.	W.	W.	12.6	16.8	10.8	13.4	West.	6	6	6*	......	....
.610	.568	.558	.581	N.	N.	N.	12.6	16.8	15.6	15.0	North.	6	6	6	......	....
.740	.768	.520	.609	S.	Calm.	N.	1.8	0.0	1.2	0.2	South.	6	6	6	......	....
.602	.509	.659	.590	S.	S.	Calm.	4.8	3.0	0.0	2.6	South.	6	2	6	......	...
.494	.634	.775	.633	S.	S.	SW.	3.0	4.8	3.0	3.4	S. 12 W.	6	6	6	......	.98
.738	......	.868	.802	NW.	N.	N.	1.8	0.6	1.2	1.1	N. 22 W.	6	2	5	......	....
.890	.610	.896	.798	W.	W.	Calm.	3.0	0.6	0.0	1.2	West.	6	6	6	......	....
.887	.698	.850	.778	S.	S.	Calm.	1.2	0.6	0.0	0.6	South.	6	6	6	......	....
.896	.898	.761	.851	S.	W.	N.	0.6	0.6	1.8	0.4	N. 27 W.	6	6	6	......	....
.721	.775	.831	.775	E.	SE.	N.	4.8	3.0	0.6	2.4	S. 78 E.	6	6	6	......	....
.896	.792	.782	.823	S.	W.	W.	0.6	12.6	13.8	8.8	S. 89 E.	6	6	6	......	....
.690	.820	.738	.683	S.	Calm.	Calm.	1.8	0.0	0.0	0.6	South.	3	2	2	......	.49
.702	.721	.712	.711	NW.	NW.	NW.	10.8	12.6	7.2	10.2	N. 45 W.	6	6	5	......	....
.629	.860	.682	.723	NW.	W.	N.	3.0	10.8	1.2	4.5	N. 76 W.	6	6	5	......	....
.659	.527	.665	.067	S.	SW.	S.	0.6	3.0	1.8	1.6	S. 25 W.	5	5	6	......	....
.754	.685	.644	.694	SE.	NE.	NE.	1.2	12.6	15.0	6.3	N. 8 E.	6	6	6	......	.56
.721	.782	.738	.747	W.	S.	S.	3.0	1.8	1.2	1.5	N. 45 W.	6	5	5	......	....
.582	.810	.791	.727	N.	E.	E.	7.2	1.8	18	2.5	N. 18 E.	6	6	6	......	....
.708	† .711	.710	.706	......	......	......	....	....	....	2.9	N. 66 W.	5.2	5.3	5.6	......	...

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	28.747	28.990	29.212	28.983	14	14	8	10	15	10	13.7	20	0	.059	.071	.040	.056
2	29.497	29.515	29.606	29.539	....	...	....	—5	—5	—15	—8.3	0	20	....	....	....	....
3	29.749	29.813	29.839	29.800	....	3	....	—10	5	—14	—6.3	3	21	....	.027	....	.027
4	29.786	29.640	29.571	29.665	....	11	15	—5	11	16	13.5	17	34	....	.071	.074	.077
5	29.524	29.522	29.493	29.513	8	15	2	9	17	2	9.3	18	—4	.051	.063	.047	.053
6	29.282	29.082	29.078	29.147	....	25	25	—6	27	27	2.7	29	15	....	.112	.112	.112
7	29.121	29.401	29.590	29.371	25	17	11	26	19	13	19.3	27	7	.123	.071	.049	.081
8	29.875	29.871	29.811	29.862	5	9	7	6	11	8	8.3	13	—1	.043	.043	.042	.044
9	29.561	29.359	29.368	29.429	13	16	18	15	18	21	18.0	22	3	.056	.067	.065	.063
10	29.670	29.644	29.598	29.637	18	14	17	20	16	18	18.0	22	8	.076	.058	.088	.074
11	29.511	29.553	29.502	29.522	14	13	9	15	15	11	14.0	18	7	.059	.051	.043	.052
12	29.592	29.683	29.587	29.621	8	15	1	10	16	2	9.3	16	3	.040	.074	.034	.049
13	29.593	29.533	29.362	29.496	6	23.5	22	6	25	24	18.3	27	—4	.057	.109	.095	.087
14	28.812	28.567	28.782	28.730	31	34.5	31	33	35.5	32	33.5	37	18	.151	.187	.165	.134
15	29.304	29.467	29.609	29.460	12	12	13	14	14	14	14.0	31	7	.052	.052	.071	.058
16	29.774	29.624	29.451	29.617	7	21	13	9	24	15	16.0	27	4	.037	.078	.063	.059
17	29.330	29.315	29.160	29.268	27	36	32	28	39	31	23.7	44	10	.136	.173	.155	.154
18	29.118	29.108	29.121	29.115	35	40	23	36	43	25	34.7	45	20	.181	.208	.100	.164
19	29.295	29.195	29.383	29.291	23	23	21	25	25	22	24.0	36	12	.100	.101	.101	.100
20	29.599	29.698	29.805	29.701	13	15	10	15	16	12	14.3	23	4	.056	.074	.046	.058
21	29.946	29.879	29.852	29.893	8	22	6	10	24	8	14.0	27	—5	.040	.092	.034	.056
22	29.710	29.661	29.580	29.650	....	23	8	—4	25	10	10.3	27	—8	....	.100	.040	.070
23	29.483	29.451	29.383	29.439	10	32	29	12	33	31	25.3	37	1	.046	.168	.137	.117
24	29.403	29.360	29.354	29.372	26	32	21	28	33	23	28.0	35	23	.117	.168	.090	.125
25	89.345	29.362	29.299	27.368	21	33	30	26	34	32	30.7	37	22	.106	.175	.144	.108
26	29.051	28.967	29.105	29.037	30	27	22	31	29	24	28.0	31	23	.155	.121	.095	.124
27	29.383	29.425	29.391	29.383	20	23	17	21	25	20	22.3	31	17	.096	.100	.059	.085
28	27.350	29.290	29.170	29.270	22	31	27	21	34	29	28.7	35	15	.095	.151	.121	.123
Means.....	29.442	29.430	29.432	29.438	*17.3	†21.4	‡16.8	14.5	22.2	16.2	17.6	....	....	*.084	†.103	‡.081	.089
March 1	29.165	29.183	29.288	29.212	21	30	18	26	32	20	26.0	35	4	.106	.155	.076	.112
2	29.315	29.381	29.433	29.376	11	22	12	13	21	13	17.0	36	5	.049	.084	.063	.065
3	29.571	29.616	29.679	29.622	8	18	1	10	20	2	10.7	25	—2	.040	.076	.034	.050
4	29.878	29.759	29.487	29.708	...	18	8	—7	21	10	8.0	23	15	....	.065	.040	.052
5	29.120	28.959	28.824	28.967	20	26	28	22	28	30	26.7	31	5	.085	.117	.134	.111
6	29.257	29.380	29.366	29.334	13	13	22	15	15	25	18.3	30	—3	.056	.056	.084	.065
7	29.397	29.295	29.115	29.269	...	23	16	—2	25	18	13.7	31	—6	....	.100	.067	.083
8	28.892	28.963	28.921	28.905	20	18	11	22	20	14	18.7	25	8	.085	.076	.037	.066
9	29.208	29.285	29.177	29.223	4	8	16	5	10	18	11.0	22	0	.041	.040	.067	.049
10	29.010	29.034	29.350	29.131	20	28	21	22	30	23	25.	30	10	.085	.130	.090	.068
11	29.398	29.484	29.485	29.455	9	16	12	11	18	14	14.3	34	4	.043	.067	.052	.054
12	29.625	29.651	29.627	29.634	7	13	6	9	15	8	10.7	21	2	.037	.056	.034	.042
13	29.626	29.586	29.398	29.536	10	23	...	12	26	10	16.0	28	4	.046	.089	....	.068
14	29.183	29.087	29.071	29.116	18	33	27	21	35	29	28.3	41	13	.065	.162	.121	.116
15	29.132	29.228	29.328	29.229	26	33	22	28	35	25	29.3	39	18	.117	.162	.084	.117
16	29.426	29.335	29.256	29.339	21	34	30	22	37	32	30.3	42	12	.101	.157	.144	.134
17	29.385	29.521	29.680	29.528	27	23	13	29	25	15	23.0	32	10	.124	.076	.056	.085
18	29.761	29.769	27.717	29.749	5	25	16	6	27	19	17.3	28	—1	.046	.112	.056	.071
19	29.718	29.675	29.601	29.664	18	32	30	20	35	32	29	42	8	.076	.142	.144	.120
20	29.610	29.543	29.461	29.538	20	44	32	43	45	35	34.3	47	17	.074	.275	.142	.163
21	29.359	29.334	29.224	29.305	28	35	28	30	37	30	32.3	45	25	.130	.178	.130	.146
22	29.325	29.301	29.251	29.292	29	33	30	32	35	32	33.0	37	21	.126	.162	.144	.144
23	29.223	29.206	29.205	29.211	33	37	29	35	38	31	34.7	41	22	.162	.207	.137	.168
24	29.010	29.049	29.089	29.049	25	28	23	27	30	26	27.7	34	22	.112	.130	.089	.110
25	29.188	29.263	29.282	29.244	23	23	13	25	24	15	21.3	.32	11	.100	.095	.056	.084
26	29.346	29.334	29.285	29.321	6	27	20	7	30	22	19.7	.32	1	.046	.113	.085	.08
27	29.230	29.163	29.384	29.259	26	35	27	28	37	30	31.7	39	14	.117	.178	.113	.136
28	29.428	29.489	29.581	29.499	13	17	21	14	19	22	18.3	32	8	.067	.071	.101	.079
29	29.697	29.697	29.606	29.666	16	25	19	18	27	20	21.7	31	12	.067	.112	.092	.090
30	29.464	29.348	29.385	29.399	26	35	30	28	36	32	32.	37	14	.117	.191	.144	.151
31	29.631	29.616	29.402	29.549	11	20	13	13	22	15	16.7	32	8	.049	.085	.056	.063
Means.....	29.367	29.370	29.353	29.363	§17.5	25.6	‖19.8	18.9	27.7	21.5	22.4	....	....	§.081	.119	‖.089	.096

* The mean of 23 observations. † The mean of 27 observations. ‖ The mean of 26 observations.
§ The mean of 29 observations. ‡ The mean of 30 observations.

of the north and northwestean lakes, at Ontonagon, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.659	.823	.582	.688	S	N	NW	1.2	16.8	19.2	11.0	N. 68 W.	6	6	6	......	.50
......	......	......	......	NW	NW	W	9.0	15.0	12.6	11.3	N. 60 W.	6	6	6	......	.45
......	.500	......	.500	S	S	Calm.	3.0	1.2	0.0	1.4	South.	6	5	2	......	.50
......	1.000	.829	.914	S	S	S	4.8	10.8	3.6	6.4	South.	6	6	6	......	.40
.784	.671	1.000	.818	Calm.	NW	Calm.	0.0	3.6	0.0	1.2	N. 45 W.	6	6	2	......	.36
......	.761	.761	.761	S	S	S	1.8	7.8	3.0	4.2	South.	2	5	6	......	....
.876	.692	.623	.730	W	NW	NW	16.8	15.6	18.6	15.8	N. 59 W.	6	6	6	......	....
.760	.596	.777	.711	Calm.	S	Calm.	0.0	1.2	0.0	0.4	South.	6	6	6	......	....
.648	.682	.570	.633	S	W	NE	1.8	1.2	9.6	2.5	N. 48 E.	6	6	6	......	....
.702	.659	.845	.735	SW	NW	W	13.8	9.0	3.6	6.7	S. 81 W.	6	5	6	......	....
.659	.648	.596	.634	N	N	N	3.0	3.0	1.8	2.6	North.	6	6	6	......	....
.582	.280	.718	.709	S	N	Calm.	3.0	1.8	0.0	0.4	South.	6	5	5	......	....
1.000	.809	.738	.849	Calm.	S	S	0.0	1.2	3.0	1.4	South.	2	5	5	......	....
.800	.899	.896	.865	S	S	W	4.8	3.0	1.2	2.7	S. 9 W.	6	6	6	......	....
.635	.635	.823	.697	NW	NW	NW	6.8	19.2	15.0	17.0	N. 45 W.	6	6	6	......	.45
.568	.610	.671	.616	S	S	S	1.2	0.6	3.0	1.6	South.	6	5	6	......	....
.883	.726	.792	.800	S	S	Calm	1.2	0.6	0.0	0.6	South.	6	2	5	......	...
.853	.750	.746	.783	Calm.	N	Calm.	0.0	0.6	0.0	0.2	North.	6	5	5	......	....
.746	.746	.860	.784	N	N	N	1.2	0.6	1.2	1.0	North.	5	6	5	......	....
.648	.829	.610	.695	N	N	N	15.0	1.2	0.6	5.6	North.	6	5	6	......	....
.582	.738	.553	.614	S	S	Calm.	1.2	0.6	0.0	0.6	South.	5	5	5	......	....
......	.746	.582	.664	S	N	Calm.	0.6	0.6	0.0	....	....	2	2	2	......	...
.610	.893	.788	.763	S	S	S	1.2	0.6	0.6	0.8	South.	5	5	6	......	....
.768	.893	.730	.797	SW	W	Calm.	0.6	0.6	0.0	3.7	S. 68 W.	6	6	5	......	....
.754	.895	.794	.781	S	S	Calm.	0.6	0.6	0.0	0.4	South.	6	6	6	......	....
.893	.775	.738	.802	NE	NE	NE	1.2	15.0	13.8	10.0	N. 43 W.	6	6	6	......	....
.855	.746	.556	.719	Calm.	N	N	0.0	0.6	1.2	0.6	North.	6	6	6	......	.26
.738	.800	.775	.771	Calm.	NW	S	0.0	3.0	1.2	0.7	N. 67 W.	5	6	5	......	....
* .739	† .757	‡ .729	.734	....	....	....	....	....	....	1.9	N. 59 W.	5.3	5.6	5.5	......	2.92
.754	.792	.702	.749	Calm.	NW	NW	0.0	1.8	0.6	0.8	N. 45 W.	6	5	5	......	....
.623	.622	.810	.685	S	NE	S	0.6	13.8	1.2	4.2	N. 51 E.	6	6	5	......	....
.582	.702	.718	.667	Calm.	NE	Calm.	0.0	4.8	0.0	1.6	N. 45 E.	6	5	5	......	....
......	.570	.582	.576	S	N	N	3.0	1.2	0.6	0.4	South.	2	2	5	......	....
.721	.768	.782	.757	S	S	S	12.6	12.0	3.0	9.2	South.	6	6	6	......	.22
.648	.648	.622	.637	NW	NW	NW	13.0	16.8	4.8	11.5	N. 43 W.	6	5	6	......	....
......	.746	.682	.714	S	N	N	3.0	1.8	1.2	0.0	—	2	2	5	......	....
.721	.702	.457	.626	W	W	W	7.2	13.8	12.6	11.2	West.	6	6	6	......	....
.750	.582	.682	.671	NW	W	W	16.8	19.2	1.2	11.7	N. 71 W.	6	6	5	......	....
.721	.782	.730	.744	SW	NW	NW	1.2	15.0	9.0	8.0	N. 48 W.	5	5	5	......	....
.596	.682	.635	.637	N	N	N	1.2	0.6	3.0	1.6	North.	6	5	6	......	25
.568	.648	.553	.589	N	NW	NW	7.8	13.8	7.2	9.0	N. 33 W.	5	5	6	......	....
.610	.634	......	.614	Calm.	W	W	0.0	1.2	1.2	0.8	West.	2	5	5	......	....
.570	.841	.775	.728	S	Calm.	S	1.2	0.0	1.2	0.8	South.	6	2	5	......	....
.768	.841	.622	.743	S	NE	N	0.6	0.6	0.6	0.2	N. 45 E.	6	6	6	......	....
.860	.712	.794	.788	S	N	N	0.6	1.2	0.6	0.4	North.	2	5	5	......	....
.775	.702	.648	.708	NE	NE	Calm.	10.8	13.8	0.0	8.2	N. 45 E.	6	5	5	......	....
.769	.761	.541	.690	S	N	N	1.8	1.2	0.6	0.0	—	2	5	2	......	....
.702	.698	.794	.731	S	N	N	0.6	0.6	0.6	0.2	North.	2	2	5	......	....
.598	.920	.698	.738	W	S	S	1.2	3.0	1.2	1.4	S. 16 W.	5	6	5	......	...
.782	.807	.782	.790	S	NW	S	0.6	1.8	0.6	0.4	West.	6	5	5	......	...
.694	.841	.794	.779	Calm.	S	S	0.0	0.6	1.2	0.6	South.	6	6	6	......	....
.797	.905	.788	.830	S	Calm.	Calm.	0.6	0.0	0.0	0.2	South.	6	6	5	......	.12
.761	.782	.634	.725	W	W	W	1.8	4.8	7.2	4.6	West.	2	5	5	......	....
.746	.738	.648	.710	NW	NW	Calm.	9.0	9.6	0.0	6.2	N. 45 W.	5	5	5	......	....
.769	.675	.721	.721	S	N	N	0.6	0.6	0.6	0.2	North.	2	2	2	......	....
.768	.807	.675	.750	S	S	W	1.2	0.6	4.2	0.7	S. 34 W.	6	6	6	......	08
.816	.698	.860	.789	N	NW	NW	12.6	13.2	15.0	12.3	N. 32 W.	6	6	6	......	....
.682	.761	.850	.764	N	N	N	1.8	1.2	0.6	1.2	North.	6	2	5	......	....
.768	.900	.794	.820	S	N	NW	1.2	0.6	1.2	0.2	N. 76 W.	6	6	6	......	....
.623	.721	.648	.664	NW	N	N	15.0	1.2	0.6	5.5	N. 39 W.	6	2	6	......	05
§ .708	.741	‖ .700	.713	....	....	....	....	....	....	2.2	N. 49 W.	4.8	4.6	5.1	......	72

* The mean of 23 observations. † The mean of 27 observations. ‡ The mean of 26 observations.
§ The mean of 29 observations. ‖ The mean of 30 observations.

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	28.945	28.907	28.692	28.781	29	40	48	30	43	49	40.7	56	9	.149	.208	.322	.226
2	28.888	28.946	29.241	29.025	32	34	48	34	37	49	40.0	51	8	.155	.157	.322	.211
3	29.656	29.720	29.478	29.618	18	25	20	20	27	22	23.0	55	8	.076	.112	.085	.091
4	29.388	29.381	29.392	29.387	24	47	40	26	50	43	39.7	57	17	.106	.283	.208	.199
5	29.398	29.491	29.558	29.482	34	38	34	37	40	36	37.7	44	31	.157	.203	.170	.177
6	29.655	29.725	29.741	29.707	28	30	32	29	32	34	31.7	36	15	.142	.144	.155	.147
7	29.775	29.719	29.683	29.726	21	31	22	24	33	24	27.0	37	8	.079	.151	.095	.108
8	29.705	29.627	29.545	29.626	15	34	26	17	36	28	27.0	40	8	.063	.170	.117	.150
9	29.408	29.269	29.138	29.272	31	40	42	33	47	44	41.3	48	21	.151	.156	.241	.183
10	29.085	29.033	29.031	29.051	36	41	46.5	37	44.5	49	43.5	50	21	.199	.211	.283	.231
11	29.135	29.306	29.455	29.299	34	31.5	31.	35	32.5	32	33.2	40	21	.183	.165	.162	.170
12	29.585	29.491	29.415	29.497	26	36	30	28	38	32	32.7	40	13	.117	.186	.144	.149
13	29.408	29.385	29.395	29.396	30	53	31	35	55	35	41.7	59	19	.109	.376	.128	.204
14	29.421	29.398	29.395	29.405	33	41	40	36	47	44	42.3	53	24	.149	.179	.195	.174
15	29.335	29.311	29.266	29.304	38	42	41	41	47	44	44.0	51	25	.190	.202	.218	.203
16	29.307	29.256	29.255	29.273	42	63	53	44	65.5	55	54.8	70	31	.241	.542	.376	.386
17	29.165	29.087	29.060	29.104	50	65	56	51	70	58	59.7	74	43	.348	.550	.422	.440
18	29.006	28.920	28.953	28.960	53	61	50	55	76	52	61.0	83	31	.376	.336	.334	.349
19	29.193	29.276	29.308	29.259	39	41	43	40	42	44	42.0	45	35	.225	.244	.264	.244
20	29.508	29.526	29.572	29.535	36	38	39	36	38	39	37.7	44	32	.212	.229	.238	.226
21	29.538	29.597	29.573	29.569	42	48	39	43	50	41	44.7	54	33	.254	.309	.212	.258
22	29.545	29.508	29.492	29.515	39	43.5	36	41	46	38	41.7	48	31	.212	.250	.186	.216
23	29.485	29.425	29.406	29.439	33	45	56	35	49	58	47.3	60	25	.162	.247	.422	.277
24	29.418	29.509	29.551	29.493	39	38	34	41	41	35	39.3	60	24	.212	.190	.170	.191
25	29.587	29.523	29.531	29.547	32	40	38	34	45	40	39.7	50	25	.162	.182	.203	.182
26	29.538	29.448	29.451	29.479	40	52	34	43	54	36	44.3	60	23	.208	.362	.170	.147
27	29.403	29.321	29.336	29.353	40	50	57	43	57	60	53.3	65	33	.208	.268	.426	.297
28	29.383	29.362	29.351	29.365	37	38	50	39	40	53	44.0	62	34	.194	.203	.321	.239
29	29.368	29.355	29.387	29.270	33	45	38	35	50	40	41.7	56	22	.162	.234	.203	.200
30	29.333	29.246	29.191	29.197	38	55	48	42	57	50	49.7	70	28	.177	.407	.309	.298
Means.....	29.385	29.364	29.328	29.358	33.4	42.9	40.0	36.1	46.3	42.1	41.5	....	....	.179	.251	.240	.223
May 1	29.165	29.186	29.344	29.232	46	45	38	50	54	40	48.0	56	31	.258	.181	.203	.214
2	29.425	29.442	29.393	29.420	32	36	37	35	40	39	38.9	47	30	.142	.160	.194	.165
3	29.348	29.283	29.325	29.319	37	40	35	39	42	37	39.3	44	32	.191	.221	.178	.198
4	29.278	29.293	29.451	29.341	37	40	37	40	43	39	40.7	44	29	.181	.208	.194	.194
5	29.496	29.584	29.586	29.553	35	40	36	37	42	38	39.0	43	30	.178	.221	.186	.195
6	29.593	29.574	29.506	29.558	30	44	42	32	50	45	42.3	53	20	.144	.209	.228	.194
7	29.443	29.481	29.312	29.412	39	53	48	41	55	50	48.7	60	31	.212	.376	.309	.299
8	29.214	29.246	29.380	29.290	52	49	39	56	56	44	52.0	60	34	.335	.255	.173	.254
9	29.393	29.309	29.251	29.318	37	56	46	39	58	48	48.3	61	31	.194	.422	.284	.300
10	29.230	29.343	29.306	29.293	42	44	39.5	44	45	41	43.3	53	37	.241	.275	.223	.260
11	29.451	29.404	29.401	29.419	38	48	47	39	56	50	48.3	55	29	.216	.230	.283	.243
12	29.403	29.406	29.381	29.397	43	50	43	45	59	45	49.7	63	33	.251	.242	.251	.248
13	29.356	29.381	29.476	29.411	36	42	40	38	47	43	42.7	52	28	.186	.202	.208	.199
14	29.571	29.578	29.421	29.524	37	45	41	39	50	44	41.3	55	27	.194	.234	.218	.215
15	29.248	29.105	29.110	29.154	47	49	48	48	51	49	49.3	54	34	.310	.321	.322	.318
16	29.117	29.164	29.238	29.173	40	41	41	41	43	42	42.	49	35	.235	.231	.244	.237
17	29.461	29.456	29.476	29.464	42.5	50	39	44	53	42	46.3	55	37	.252	.321	.199	.257
18	29.466	29.405	29.341	29.404	37	50	51	40	60	53	51.0	64	30	.181	.229	.348	.253
19	29.240	29.090	29.062	29.131	54	62	71	56	75	76	69.0	87	35	.391	.382	.691	.488
20	29.120	29.099	29.147	29.122	69	73	74	74	91	77	80.7	94	67	.641	.569	.799	.670
21	29.275	29.287	29.327	29.296	69	82	70	72	90	74	78.7	93	66	.668	.983	.679	.777
22	29.310	29.288	29.238	29.279	67	72	64	70	74	67	70.3	87	57	.622	.737	.576	.645
23	29.213	29.145	29.085	29.148	63	59	53	64	61	55	60.0	67	47	.562	.473	.376	.470
24	29.159	29.194	29.237	29.197	46	49	47	46	51	48	48.3	56	37	.311	.321	.315	.314
25	29.332	29.387	29.409	29.336	43	49	45	43	50	46	46.3	58	34	.278	.335	.288	.300
26	29.454	29.438	29.472	29.455	41	50	46	45	53	48	48.7	57	35	.275	.321	.284	.293
27	29.516	29.481	29.479	29.492	47	52	59	50	56	61	55.7	61	40	.263	.335	.473	.361
28	29.454	29.418	29.316	29.396	48	58	56	50	64	58	57.3	65	39	.309	.403	.422	.378
29	29.279	29.184	28.980	29.114	53	63	65	55	73	66	64.7	80	41	.376	.442	.601	.474
30	28.945	28.900	29.885	28.910	50	57	56	53	61	58	57.3	67	42	.321	.412	.422	.385
31	28.878	28.842	28.816	28.845	46	47	45	48	50	46	48.	55	42	.284	.283	.266	.281
Means	29.319	29.302	29.327	29.316	43.7	52.0	48.3	47.5	56.6	51.6	51.9	...	....	.267	.340	.303	.303

of the north and northwestern lakes, at Ontonagon, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.890	.750	.926	.855	SW.	W.	S.	1.2	0.6	16.8	5.8	S. 5 W.	6	5	5	......	....
.792	.712	.926	.810	NW.	W.	N.	3.0	12.6	15.0	7.5	N. 41 W.	5	6	6	......	....
.702	.761	.721	.728	W.	Calm	S.	4.8	0.0	1.2	1.2	North	6	6	2	......	....
.754	.786	.750	.763	S.	S.	Calm	3.0	4.8	0.0	2.6	South	2	5	5	......	....
.712	.820	.802	.778	NW.	Calm	Calm	3.0	0.0	0.0	1.0	N. 45 W.	6	2	6	......	....
.887	.794	.792	.824	NE	NE	NE	4.8	13.2	3.0	7.0	N. 45 E.	5	2	5	......	....
.610	.800	738	.716	Calm	NE	NE	0.0	12.6	8.0	5.2	N. 45 E.	5	5	2	......	....
.671	.802	.768	.747	S.	NE	Calm	6	3.0	0.0	0.8	N. 54 E.	2	2	5	......	....
.800	.483	.836	.706	S.	S.	S.	1.2	0.6	1.8	1.2	South	5	6	6	......	....
.903	.720	.817	.813	Calm	NE	NE	0.0	1.2	4.8	2.0	N. 45 E.	5	5	6	......	....
.898	.897	.896	.897	E.	NE	NE	9.6	15.0	10.8	11.0	N. 55 E.	6	6	6	......	.05
.768	.811	.794	.791	S.	NE	Calm	1.2	3.0	0.0	0.7	N. 67 E.	5	5	5	......	....
537	.869	.628	.678	S.	Calm	NE	3.0	0.0	1.2	0.7	S. 20 E.	5	5	5	......	....
.705	.554	.677	.645	S.	NE	N.	0.6	1.2	0.6	0.4	N. 45 E.	5	5	5	......	....
.738	.624	.756	.706	Calm	NE	NE	0.0	4.8	1.2	2.0	N. 45 E.	5	2	5	......	....
.836	.864	.869	.856	S.	S.	Calm	3.0	7.2	0.0	3.4	South	5	5	5	......	....
.929	.751	.876	.852	S.	S.	Calm	11.4	13.8	0.0	8.4	South	5	2	5	......	....
.869	.375	.861	.702	S.	S.	W.	3.0	9.0	7.2	4.7	S. 31 W.	5	5	6	......	....
.910	.914	.918	.914	W.	NE	S.	1.2	3.0	3.0	0.4	S. 45 E.	6	6	6	......	....
1.000	1.000	1.000	1.000	NE	NE	NE	9.0	6.0	4.8	6.6	N. 45 E.	6	6	6	......	....
.916	.856	.824	.865	E.	NE	NE	3.0	9.6	3.0	4.9	N. 53 E.	5	6	5	......	60
.824	.805	.811	.813	Calm	NE	NE	0.0	9.6	3.0	4.2	N. 45 E.	5	5	5	......	....
.797	.710	.876	.794	Calm	NW	Calm	0.0	3.0	0.0	1.0	N. 45 W.	1	8	5	......	....
.824	.738	.802	.788	NE	NE	Calm	1.2	11.4	0.0	4.2	N. 45 E.	2	2	2	......	..
.797	.607	.820	.741	Calm	NE	Calm	0.0	10.8	0.0	3 6	N. 45 E.	2	2	2	......	....
.750	.867	.802	.806	Calm	SW	Calm	0.0	1.2	0.0	0.4	S. 45 W.	2	2	5	......	....
.750	.577	.822	.716	S.	W.	Calm	3.0	1.2	0.0	1.1	S. 22 W.	2	2	2	......	....
.816	.820	.798	.811	NE	NE	NE	11.4	15.0	13.8	13.4	N. 45 E.	5	5	5	......	....
.797	.646	.820	.754	W.	NW.	Calm	1.2	1.2	0.0	0.7	N. 68 W.	2	2	2	......	....
.661	.874	.856	.797	S.	N.	Calm	1.2	0.6	0.0	0.2	South	2	2	5	......	....
.798	.752	.819	.788	......	......	......	....	....	....	....	N. 58 E.	1.3	4.0	4.6	......	0.65
.716	.434	.820	.657	SW.	NE	NE	7.2	9.0	7.0	3.0	N. 45 E.	5	5	5	......	....
.698	.645	.818	.720	E.	NE	NE	6.0	7.8	6.6	6.3	N. 58 E.	5	5	5	......	....
.816	.829	.897	.817	E.	E.	E.	5.4	7.2	3.0	5.2	East	6	6	5	......	....
.732	.750	.816	.766	E.	E.	E.	3.6	4.8	3.0	3.8	East	5	6	5	......	....
.807	.829	.811	.816	NE	NE	NE	13.8	16.8	4.8	11.8	N. 45 E.	5	5	5	......	....
.794	.581	.762	.712	S	NW	Calm	3.0	3.0	0.0	6.7	S. 67 W.	5	2	5	......	....
.824	.869	.856	.850	S.	NE	NW	0.6	1.8	1.2	0.4	N. 16 E.	2	2	2	......	....
.747	.569	.597	.638	S.	NW	W.	7.2	15.0	3.0	4.7	N 75 W.	2	5	5	....	....
.816	.876	.850	.847	S.	NE	NW	1.8	9.0	3.0	2.7	N. 33 E.	5	5	5	......	....
.836	.920	.867	874	E.	N.	N.	3.0	1.2	0.6	1.2	N. 59 E.	6	8	8	......	.13
.907	.512	.786	.735	S.	SW.	Calm	0.6	0.6	0.0	0.3	S. 22 W.	8	5	5	......	....
.840	.848	.840	.721	W.	W.	W.	4.8	5.4	3.0	4.4	West	5	5	5	......	....
.811	.624	.750	.728	S.	NE	Calm	1.2	4.8	0.0	1.3	N. 57 E.	5	6	6	......	....
.816	.646	.756	.739	W.	N.	Calm	3.0	3.0	0.0	1.4	N. 45 W.	2	2	5	......	....
.925	.859	.926	.903	S.	S.	Calm	4.8	6.6	0.0	3.8	South	5	6	8	......	....
.912	.833	.914	.890	NW.	NW	NW	10 8	15.0	15.0	13.6	N. 45 W.	6	5	6	......	.20
.876	.798	.744	.806	NW.	NW	Calm	7.2	4.8	0.0	4.0	N. 45 W.	5	5	5	....	.08
.732	.448	.864	.679	S.	NW	Calm	1.2	4.8	0 0	1.3	N. 57 W.	2	5	5	......	....
.872	.441	.771	.695	SW.	W.	SW.	7 8	3.0	12.6	7.5	S. 51 W.	5	2	5	......	....
.764	.391	.862	.639	S.	SW.	SW.	10.8	9.0	4.8	7.7	S. 25 W.	2	2	5	......	....
.852	.698	.810	.787	S.	S.	S.	4.8	13.2	9.0	9.0	South	5	5	5	......	....
.848	.903	.841	.864	S.	S.	SW.	10.8	12.6	3.0	8.5	S. 5 W.	2	5	6	......	....
.943	.882	.869	.898	S.	S.	NE	1.8	0.6	3.0	0.7	S. 81 E.	6	6	6	......	.56
1.000	.859	.925	.918	W.	W.	Calm	1.2	1.8	0.0	1.0	West	9	10	8	......	.40
1.000	.927	.921	.949	S.	Calm	Calm	0.6	0.0	0.0	0.2	South	8	8	10	......	....
.920	.798	.850	.856	NW.	N.	N.	0.6	1.8	3 0	1.7	N. 5 W.	10	2	5	......	.32
.786	.747	.882	.805	W.	N.	Calm	1.2	3.0	0.0	1.1	N. 22 W.	2	5	5	......	....
.856	.675	.876	.802	S.	N.	Calm	1.2	1.2	0.0	0.0	....	5	2	2	......	...
.869	.545	.945	.786	S.	N.	S.	0.6	3.0	0.6	0.6	North	2	2	5	......	....
.798	.769	.876	.814	Calm	N.	E.	0.0	3.0	7.2	2.7	N. 68 E.	5	2	5	......	....
.850	.786	.921	.852	N.	N.	N.	3.0	0.6	0.6	1.4	North	5	6	6	......	[illegible]
.805	.700	.804	.796	......	......	......	....	....	....	....	N. 39 W.	4.8	4.6	5.7	......	1.69

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit. Expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	28.742	28.956	29.058	28.919	44	51	46	44	58	48	50.0	51	39	.288	.282	.284	.285
2	29.187	29.294	29.349	29.277	45	50	44	46	52	46	48.0	59	41	.286	.334	.262	.294
3	29.353	29.314	29.209	29.292	45	54	51	47	60	53	53.3	64	34	.273	.338	348	.320
4	29.177	29.214	29.264	29 218	48	46	45	50	48	46	48.0	54	41	309	.284	.286	.293
5	29.355	29.449	29.572	29.459	43	46	38	45	50	40	45.0	51	36	.251	.258	.203	.237
6	29.697	29.743	29.705	29.715	40	48	41	42	51	43	45.3	53	34	.221	.296	.231	.249
7	29.752	29.695	29.698	29.715	42	49	45	45	54	47	48.7	55	30	.228	.282	.273	.261
8	29.677	29.606	29.575	29.619	40	49	47	42	53	48	47.7	59	37	.221	.295	·310	.275
9	29.460	29.354	29.317	29.377	50	54	52	53	60	55	56.0	67	33	.321	.338	.349	.336
10	29.266	29.211	29.176	29.218	56	61	58	60	71	60	63.7	78	40	.396	.403	.456	.418
11	29.276	29.314	29.392	29.327	52	50	44	53	53.5	46	50.8	61	43	.375	.315	.262	.317
12	29.425	29.389	29.334	29.383	47	56	59	49	58	61	56.0	69	34	.297	.422	.473	.397
13	29.374	29.371	29.314	29.353	59	64	70	61	72	73	68.7	83	46	.473	.489	.693	.552
14	29.302	29.199	29.298	29.233	70	75	65	77	93	68	79.3	95	54	.639	.624	.577	.613
15	29.445	29.433	29.391	29.423	56	57	62	61	60	65	62.0	76	52	.383	426	.516	.442
16	29.256	29.110	29.170	29.179	59	71	68	69	94	72	78.3	94	54	.367	.449	.631	.482
17	29.260	29.198	29.110	29.189	57	58	62	61	69	66	65.3	76	58	.412	.336	.502	.417
18	29.038	29.075	29.068	29.060	53	53	49	57	58	52	55.7	71	53	.350	.336	.308	.331
19	29.075	29.085	29.133	29.098	51	53	47	53	56	49	52.7	58	43	.348	.363	.297	.336
20	29.163	29.148	29.200	29.170	49	52	46	52	57	48	52.3	50	43	.308	.322	.284	.305
21	29.220	29.206	29.287	29.238	49	47	47	50	48	48	48.7	52	42	.335	.310	.310	.318
22	29.520	29.355	29.407	29.427	48	51	50	49	53	51	51.0	57	36	.322	.348	.348	.339
23	29.491	29.456	29.533	29.493	51	58	57	52	63	60	58 3	65	48	.361	.416	.426	.401
24	29.400	29.322	29.285	29.336	55	65	63	58	73	65	65.3	81	54	.393	.510	.549	.484
25	29.342	29.335	29.402	29 359	65	63	64	72	76	66	71.3	80	54	.524	.402	.569	.498
26	29.375	29.310	29.242	29.309	63	62	68	68	68	70	68.7	75	60	.509	.476	.658	.548
27	29.272	29.227	29.276	29.258	67	70	69	72	81	72	75.0	85	55	.595	.585	.668	.616
28	29.200	29.193	29.178	29.190	57	58	56	60	58	57	58.3	61	50	.426	.482	.436	.448
29	29.192	29.239	29.190	29.207	54	53	50	56	55	52	54.3	58	47	.391	.376	.334	.367
30	29.222	29.216	29.206	29.215	54	59	54	56	62	55	57.7	65	54	.391	.460	.404	.418
Means.....	29.317	29.300	29.311	29.309	53.3	56.1	53.9	55.3	62.1	56.9	57.8	....	....	.366	.385	.408	.386

of the north and northwestern lakes, at Ontonagon, Michigan.

VAPOR.				WIND.								Amount of cloudiness, (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
1.000	.584	.850	.811	NW.....	NW...	NW...	15.0	10.8	7.2	11.0	N. 45 W.	6	6	6	......	....
.921	.861	.843	.875	NW.....	NW...	Calm..	1.8	1.2	0.0	1.0	N. 45 W.	5	5	5	......	.
·847	.653	.864	.788	SW.	SW. ..	SW...	11.4	9.0	3.0	7.8	S. 45 W.	6	2	5	.070	0.65
.856	.850	.921	.876	Calm....	N.	Calm..	0.0	4.8	0.0	1.6	North...	6	8	10	.140	....
.840	.716	.820	.792	N.	N.	N.	4.8	12.6	3.0	6.8	North ...	6	5	5	.080	0.10
.829	.790	.833	.817	NW.....	N.	N.	3.0	9.0	1.2	4.2	N. 10 W.	5	5	5	.135	....
.762	.674	.847	.761	S........	N.	W.....	1.2	7.8	1.2	2.2	N. 11 W.	2	5	5	.105	....
.829	.733	.925	.829	S........	N.	Calm..	1.2	7.8	0.0	2.2	North ...	2	2	5	.120	....
.798	.653	.805	.752	S........	N.	Calm..	5.4	3.0	0.0	0.8	South....	2	5	5	.120	....
.765	.532	.880	.726	W..	NW...	N.	3.0	3.0	3.0	2.4	N. 45 W.	2	2	2	.200	....
.932	.767	.843	.847	N.	N.	N.	9.0	6.6	1.2	5.6	North ...	5	5	5	.120	....
.853	.876	.882	.870	S........	N.	W.....	1.2	7.2	3.0	2.2	N. 27 W.	2	2	5	.160	....
.882	.624	.854	.787	S........	W.....	Calm..	7.8	3.0	0.0	2.8	S. 21 W.	2	2	2	.010	....
.689	.403	.843	.645	SW.	SW. ..	SW...	10.8	15.0	9.0	11.6	S. 45 W.	5	5	5	.280	....
.713	.822	.836	.790	Calm....	N.	SE.. ..	0.0	10.8	10.8	2.7	N. 66 E.	2	5	5	.260	....
.518	.281	.804	.534	S	SW. ..	S......	15.0	16.8	9.0	12.5	S. 18 W.	5	5	5	.350	....
.769	.475	.786	.677	W.......	W.....	W.....	10.8	9.0	7.2	9.0	West....	6	6	6	.140	....
.752	.698	.794	.748	W.......	W.....	W.....	8.4	7.8	7.2	7.8	West....	6	8	8	.170	....
.864	.809	.853	.842	W.......	NW...	N.	3.0	3.0	1.2	2.0	N. 57 W.	4	5	6	.080	....
.794	.692	.850	.775	N.	N.....	Calm..	5.4	1.8	0.0	2.4	North ...	4	2	6	......	....
.927	.925	.925	.926	NW.....	N.	NE....	1.8	1.2	1.2	1.1	N. 7 W.	6	8	7	......	0.32
.926	.864	.929	.906	NW.....	NW...	Calm..	1.2	0.6	0.0	0.6	N. 45 W.	2	6	3	.130	0.33
.930	.723	.822	.825	S........	NE....	Calm..	0.6	0.6	0.0	0.1	S. 63 E.	0	1	0	.100	0.05
.816	.629	.890	.778	S........	NW...	SW...	1.2	1.2	1.8	0.8	N. 51 W.	0	4	2	.120	....
.668	.448	.891	.669	S........	W.....	Calm..	1.8	1.2	0.0	0.7	S. 34 W.	2	0	0	.235	....
.743	.695	.898	.779	Calm....	N.	S......	0.0	1.2	0.6	0.2	North ...	3	2	2	.199	....
.758	.554	.852	.721	S........	NE....	SW...	1.8	1.8	1.8	0.6	South. .	1	2	1	.166	....
.822	1.000	.936	.919	N.	N.	N.	2.4	1.2	2.4	2.0	North ...	4	8	8	.080	0.36
.872	.869	.861	.867	NE......	N.	Calm..	1.2	1.2	0.0	0.7	N. 22 E..	7	7	2	.030	....
.872	.828	.934	.878	W.......	NE ...	Calm..	1.2	1.2	0.0	0.3	N. 27 W.	2	1	2	.030	....
.818	.701	.862	.794	....	....	....	....	....	....	1.6	N. 75 W.	3.6	4.3	4.4	......	1.81

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.215	29.382	29.451	29.349	64	65	53	70.5	77	56.5	68.0	80	56	.509	.457	.356	.440
2	29.409	29.283	29.145	29.279	59	64	58	64.5	79	64.5	69.3	80.5	48	.427	.396	.396	.406
3	28.995	28.934	26.937	28.955	65	70	61	69	79	68.5	72.1	80	61	.564	.612	.436	.537
4	....	....	29.161	29.161	....	....	58	....	....	59	59.0	68.5	59	....	....	.469	.469
5	29.352	29.399	29.402	29.384	51	59.5	50	57	66	54	59.0	70	54	.378	.396	.308	.357
6	29.347	29.438	29.317	29.357	54	62	60	58	66	62	62.0	70.5	48	.365	.502	.491	.452
7	29.098	29.071*	29.171	29.116	67	72.5	65.5	69	75	67	70.3	82	60	.635	.765	.607	.669
8	29.176	28.965	29.011	29.050	61	60.5	58	63	63	58	61.3	68	...	.510	.494	.482	.495
9	29.113	29.194	29.212	29.176	61	65	55.5	62	70	58	63.3	74	54	.523	.550	.407	.493
10	29.216	29.134	29.092	29.147	65	67	63.5	68	78	68.5	68.1	80.5	54	.577	.514	.519	.536
11	28.918	29.089	29.436	29.147	64.5	64	58.5	67	76	64	69.0	79	63	.573	.436	.419	.476
12	29.436	29.488	29.448	29.454	55	61	55	59.5	66	57	60.8	67.5	65	.373	.470	.407	.416
13	29.386	29.342	29.230	29.319	60	64	61	64	70.5	64	66.1	73.5	55	.465	.509	.497	.490
14	29.259	29.318	29.396	29.321	55	56.5	50	59.5	65	55	59.8	68.5	53	.373	.344	.295	.337
15	29.483	29.517	29.533	29.511	51	51	45.5	56	63.5	48	55.8	65.5	46.5	.308	.209	.271	.262
16	29.573	29.507	29.358	29.479	49	60	60	52.5	68	63.5	61.3	70.5	39	.302	.411	.471	.394
17	29.265	29.224	29.418	29.302	60	66	58	63.5	76.5	61	67.0	77	60.5	.471	.498	.443	.470
18	29.500	29.454	29.346	29.433	57	62.5	54	58.5	67	57	61.1	70	50	.432	.506	.378	.438
19	29.265	29.186	29.300	29.250	62	69	61	66	86.5	63	71.8	88	54.5	.502	.473	.510	.495
20	29.364	29.390	29.413	29.389	57	63	56	59	68.5	59	62.1	71	56.5	.439	.502	.409	.450
21	29.369	29.265	29.105	29.246	52	62	61	53	67	63	61.0	68.5	49.5	.375	.489	.510	.454
22	29.066	29.080	29.125	29.090	57.5	65	60	60	76.5	65	67.1	79.5	57	.440	.490	.451	.460
23	29.452	29.561	29.571	29.528	47.5	52.5	41	54	60	43	52.3	62.5	42	.243	.296	.231	.256
24	29.517	29.384	29.272	29.391	53	63	63	58	76	68	67.3	79.5	39	.336	.402	.509	.415
25	29.203	29.220	29.172	29.198	65	70.5	65	66	75.5	67	69.5	77	66	.604	.678	.591	.624
26	29.166	29.155	29.193	29.171	66.5	68	63	69	72	65	68.7	79	64	.617	.559	.549	.575
27	29.204	29.241	29.215	29.220	58	63	58	59	67	59	61.7	72	55	.469	.522	.469	.486
28	29.183	29.218	29.328	29.243	64	64	54	68.5	79	58	68.5	82	57	.536	.529	.365	.476
29	29.464	29.544	29.506	29.504	54	55	41.5	57.5	63	44	54.8	65	43	.371	.327	.229	.309
30	29.460	29.401	29.289	29.383	50	60.5	60	56	74	67	65.7	79.5	41	.282	.347	.425	.351
31	29.144	28.972	28.900	29.005	60	65.5	63	64	72	65	67.0	73.5	63	.465	.541	.549	.518
Means.....	29.286	29.278	29.272	29.276	58.2	62.9	57.1	61.7	71.4	60.3	64.2	....	...	.449	.474	.434	.452
Sept. 1	29.074	29.264	29.361	29.233	43	42.5	41	44.5	46	44	44.8	47.5	41	.258	.226	.218	.227
2	29.411	29.342	29.218	29.390	41	51.5	49	41	56.5	53.5	50.3	58.5	31	.257	.328	.258	.290
3	29.173	29.045	28.941	29.053	52	66.5	68	55	77	75	69	80.5	49.5	.349	509	.591	.483
4	29.000	29.016	29.230	29.082	70	73	63	76	90	69	78.3	92	68	.652	.582	.495	.579
5	29.295	29.374	29.403	29.357	52	51	47	54	53	51	52.7	55	48	.362	.348	270	.326
6	29.365	29.330	29.213	29.302	49.5	51	52.5	50.5	54	53.5	52.7	55.5	47.5	.342	.389	.382	.371
7	29.111	29.035	29.006	29.050	54	64	58.5	55	70	60.5	61.8	74.5	50.5	.404	.516	.464	.461
8	29.150	29.323	29.409	29.294	52.5	57	49.5	58	69	52	59.7	73	51.5	.322	.306	.321	.316
9	29.469	29.374	29.370	29.404	51	62	57.5	55	75	63	64.3	77.5	49	.321	.382	.387	.363
10	29.379	29.303	29.288	29.323	55	68	63	58.5	78	68.5	68.3	81.5	54	.387	.550	.502	.479
11	29.151	29.070	29.212	29.144	63	57.5	44.5	65	63	47	58.3	71	44.5	.549	.400	.261	.403
12	29.569	29.688	29.720	29.659	40.5	42	36	42	46	36	41.3	48	34.5	.233	.215	.212	.220
13	29.737	29.601	29.503	29.613	39	47.5	48	40	50.5	50	46.8	54	32	.225	.289	.309	.274
14	29.428	29.414	29.506	29.449	52	58	53.5	54	60	55	56.3	62	47	.362	.456	.390	.406
15	29.635	29.685	29.665	29.661	50	53.5	41	51	58	42	50.3	60	41.5	.348	.350	.244	.314
16	29.587	29.474	29.350	29.470	37	53.5	52.5	39	56.5	53	49.5	58.5	32.5	.194	.370	.389	.317
17	29.132	29.065	29.020	29.072	54	65	57	55	68	57.5	60.1	70	50	.404	.577	.467	.482
18	29.103	29.270	29.425	29.266	50	51.5	46	152	58	48	52.7	65.5	47	.331	.378	.284	.332
19	29.529	29.492	29.374	29.465	42.5	55	55	3.5	58.5	57	53	59.5	38	.259	.387	407	.351
20	29.376	....	29.480	29.428	54	....	50	56	....	52.5	54.2	63	50	.391	....	.328	359
21	29.401	29.183	29.103	29.229	52	69	62	54	73	69	65.3	75.5	49.5	.362	.655	.462	.493
22	29.244	29.280	29.289	29.271	61	59	53	64	65	55.5	61.5	73	53	.49	.420	.370	.429
23	29.240	29.368	29.420	29.342	55	49.5	42	57	52	47.5	52.1	57.5	41.5	.407	.321	.195	307
24	29.422	29.342	29.269	29.344	44	54	49	46.5	67	58	57.1	69	39.5	.255	.245	.229	.243
25	29.203	29.082	29.179	29.121	49.5	57	57.5	55	70	54	59.7	71.5	51.5	.282	293	.347	307
26	29.171	29.151	29.176	29.166	51	62	58	56	78	66	66.7	80.5	52	.308	.342	.376	.342
27	29.187	29.114	29.085	29.128	51	62	59	57	74	62	64.3	75	52	.376	.396	.460	.411
28	29.131	29.272	29.344	29.249	58	53	47	62	59	50	57	63	48.5	.429	.323	.283	.345
29	29.464	29.368	29.468	29.433	44	46.5	42	47	56	44	47.5	54	42	.249	.257	.241	.249
30	29.497	29.447	29.405	29.449	45.5	46.5	50	47.5	53	51	50.5	55	42	.279	.231	.348	.286
Means.....	29.321	29.292	29.318	29.314	59.6	52.8	51.5	53.0	59.7	54.5	56.8	...	....	.353	.384	.319	.358

of the north and northwestern lakes, at Marquette, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)				
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.				Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S inches and decimals.
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.683	.493	.780	.652	SW	SW	N	4	12	2	5.0	S. 50 W.	0	0	0	......	....
.703	.400	.653	.585	SW	S	SW	4	12	12	8.7	S. 26 W.	3	0	6	......	....
.796	.618	.627	680	S	SW	SW	2	4	4	3.2	S. 36 W	8	3	10	......	....
....	......	.939	.939	SW	W	W	2	4	4	3.2	S. 81 W.	0	10	10	......	.23
.812	.575	.738	.709	NW	SE	N	4	4	2	0.7	North	4	0	0	......	....
.756	.786	.884	.808	NW	E	E	2	4	12	4.9	N. 84 E.	0	10	10	......	.18
.896	.881	.919	.898	SW	S	Calm	25	2	0	8.8	S. 43 W.	10	5	10	......	.05
.886	.858	1.000	.914	Calm	N	N	0	2	4	2.0	North	10	10	10	......	1.35
.942	.751	.845	.846	W	SW	NW	2	2	2	1.6	West	0	3	0	......	....
.843	.537	.745	.708	S	S	S	4	12	4	6.7	South	0	10	2	......	.40
.867	.486	.701	.684	SW	SW	SW	12	45	2	19.7	S. 45 W.	4	2	0	......	....
.734	.735	.874	.781	NW	NE	S	4	2	2	0.9	N. 33 W.	2	1	0	......	....
.780	.683	.833	.765	E.	S	S	2	2	4	2.1	S. 19 E.	2	10	10	......	.02
.734	.557	.681	.657	NW	N	N	12	12	2	8.0	N. 21 W.	8	0	0	......	....
.687	.357	.813	.619	NW	N	N	2	4	2	2.5	N. 11 W.	0	0	0	......	....
.763	.601	.805	.723	S	S	S	2	2	12	5.3	South	0	8	7	......	....
.803	.517	.825	.725	S	SW	W	12	35	2	15.0	S. 36 W.	10	6	0	......	....
.850	.764	.812	.808	NW	E	Calm	2	2	0	0.5	N. 24 E.	0	0	0	......	....
.786	.375	.886	.682	W	S	Calm	2	4	0	1.5	S. 27 W.	4	5	0	......	.48
.878	.721	.819	806	Calm	N	W	0	2	2	1.0	N. 45 W.	1	2	3	......	....
.932	.740	.886	.852	Calm	E	Calm	0	2	0	0.7	East	10	10	10	......	....
.851	.575	.731	.719	N	SW	Calm	2	12	0	3.7	S. 53 W.	0	3	0	......	.62
.583	.572	.833	.662	N	N	SW	12	4	4	4.5	N. 12 W.	0	0	0	......	....
.698	.448	.743	.629	[illegible]W	S	S	12	4	4	6.3	S. 37 W.	0	3	10	......	....
.945	.769	.893	.869	SW	Calm	Calm	12	0	0	4.0	North	8	10	10	......	.18
.871	.712	.890	.824	Calm	N	Calm	0	2	0	0.7	North	0	4	10	......	.20
.939	.790	.939	.869	Calm	N	Calm	0	2	0	0.7	North	10	10	10	......	....
.770	.747	.756	.757	SW	N	N	4	12	4	4.5	N. 12 W.	2	0	0	......	....
.784	.568	.796	.716	N	N	N	2	4	4	3.3	North	0	0	0	......	....
627	.414	.642	.594	SW	SW	SW	12	12	4	9.3	S. 45 W.	3	0	0	......	....
.780	.690	.890	.786	SW	SW	N	4	4	4	1.9	S. 74 W	10	10	0	......	.22
.798	.625	.805	.743	....	....	......	...	....	....	2.5	S. 50 W	3.3	4.3	4.1	....	3.83
.878	.729	.756	.787	N	N	N	25	25	4	18.0	North	10	8	3	......	.02
1.000	.743	.702	.815	SW	E	S	4	12	4	3.8	S. 53 E.	0	0	10	......	....
.805	.550	.681	.678	S	S	S	4	12	25	13.7	South	6	0	0	......	....
.727	.413	.700	.613	SW	SW	SW	12	35	2	16.3	S. 45 W	3	3	10	......	....
.867	.864	.722	.817	N	N	N	4	4	2	3.3	North	10	10	10	......	.16
.928	.933	.932	.931	N	N	N	4	2	2	2.7	North	10	10	10	......	.80
.934	.704	.881	.843	Calm	S	Calm	0	4	0	1.3	South	6	2	0	......	.10
.669	.432	.827	.642	W	NW	SW	25	12	2	12.0	N. 78 W.	10	0	0	......	....
.743	.441	.650	611	S	S	S	2	12	4	6.0	South	0	0	0	......	....
.788	.574	.721	.694	S	S	S	4	12	4	6.7	South	0	0	10	......	.44
.890	.696	.810	.798	S	N	NW	4	25	12	10.7	N. 16 W.	10	10	10	......	.60
.871	.691	1.000	.854	N	N	N	25	12	4	13.7	North	10	10	10	......	....
.910	.788	.856	.851	Calm	SE	S	0	4	2	1.9	S. 30 E.	10	10	5	......	....
.867	.880	.901	.882	S	S	N	4	4	2	2.0	South	10	10	10	......	.13
.929	.727	.914	.856	N	N	N	4	4	4	4.0	North	10	3	0	......	....
.816	.810	.965	.863	S	SE	SE	2	2	4	2.5	S. 34 E.	7	10	10	......	1.08
.934	.843	.968	.915	SE	SW	N	2	4	2	0.9	S. 33 E.	10	8	10	......	.19
.861	.786	.850	.832	NW	NW	N	4	4	2	3.1	N. 37 W.	8	10	0	......	....
.917	.788	.874	.859	NW	NE	SE	2	4	12	3.6	S. 66 E.	2	1	2	......	....
.872	......	.829	.850	NW	....	Calm	4	..	0	2.0	N. 45 W.	9	....	10	......	...
.867	.807	.653	.775	E.	S	S	4	12	12	8.3	S. 10 E.	10	7	2	......	....
.833	.680	.839	.784	E.	SE	NW	2	2	4	0.5	N. 24 E.	0	7	0	......	....
874	.827	.594	.765	NW	N	NW	4	4	4	3.7	N. 30 E.	10	10	0	......	.72
.807	.371	.475	.551	W	W	W	4	12	12	9.3	West	0	0	3	......	....
.650	.400	.834	.628	SW	S	Calm	12	25	0	11.5	S. 14 W.	0	8	0	......	....
.687	.357	.588	.514	SW	SW	SW	12	12	4	9.3	S. 45 W.	2	0	0	......	....
.812	.472	.828	.704	S	S	S	4	25	4	11.0	South	0	0	2	......	....
.772	.647	.766	.735	W	N	N	4	4	4	3.7	N. 27 W	8	10	8	......	....
.772	.686	.836	.765	N	N	Calm	4	4	0	2.7	North	9	6	10	......	.06
.848	.574	.929	.783	E	E	E	4	4	4	4.0	East	10	10	10	......	.02
.837	.674	.797	.769	....	....	....	....	..	...	1.4	S. 62 W	6.3	5.6	5.1	......	4.32

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.		Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
					°	°	°	°	°	°	°	°	°				
1862.																	
August 1	29.215	29.382	29.451	29.349	64	65	53	70.5	77	56.5	68.0	80	56	.509	.457	.356	.440
2	29.409	29.283	29.145	29.279	59	64	58	64.5	79	64.5	69.3	80.5	48	.427	.396	.396	.406
3	28.995	28.934	28.937	28.955	65	70	61	69	79	68.5	72.1	80	61	.564	.612	.436	.537
4	.. ....	....	29.161	29.161	....	....	58	....	....	59	59.0	68.5	59	....	....	.469	.469
5	29.352	29.399	29.402	29.384	54	59.5	50	57	66	54	59.0	70	54	.378	.396	.308	.357
6	29.347	29.438	29.317	29.357	54	62	60	58	66	62	62.0	70.5	48	.365	.502	.491	.452
7	29.098	29.071*	29.171	29.116	67	72.5	65.5	69	75	67	70.3	82	60	635	.765	.607	.669
8	29.176	28.965	29.011	29.050	61	60.5	58	63	63	58	61.3	68	....	.510	.494	.482	.495
9	29.113	29.194	29.212	29.176	61	65	55.5	62	70	58	63.3	74	54	.523	.550	.407	.493
10	29.216	29.134	29.092	29.147	65	67	63.5	68	78	68.5	68.1	80.5	54	.577	.514	.519	.536
11	28.918	29.089	29.436	29.147	64.5	64	58.5	67	76	64	69.0	79	63	.573	.438	.419	.476
12	29.436	29.488	29.448	29.454	55	61	55	59.5	66	57	60.8	67.5	65	.373	.470	.407	.416
13	29.386	29.342	29.230	29.319	60	64	61	64	70.5	64	66.1	73.5	55	.465	.509	.497	.490
14	29.259	29.318	29.396	29.321	55	56.5	50	59.5	65	55	59.8	68.5	53	.373	.344	.295	.337
15	29.483	29.517	29.533	29.511	51	51	45.5	56	63.5	48	55.8	65.5	46.5	.308	.209	.271	.262
16	29.573	29.507	29.358	29.479	49	60	60	52.5	68	63.5	61.3	70.5	39	.302	.411	.471	.394
17	29.266	29.224	29.418	29.302	60	66	58	63.5	76.5	61	67.0	77	60.5	.471	.498	.443	.470
18	29.500	29.454	29.346	29.433	57	62.5	54	58.5	67	57	61.1	70	50	.432	.506	.378	.438
19	29.265	29.186	29.300	29.250	62	69	61	66	86.5	63	71.8	88	54.5	.502	.473	.510	.495
20	29.364	29.390	29.413	29.389	57	63	58	59	68.5	59	62.1	71	56.5	.439	.502	.409	.450
21	29.369	29.265	29.105	29.246	52	62	61	53	67	63	61.0	68.5	49.5	.375	.489	.510	.454
22	29.066	29.080	29.125	29.090	57.5	65	60	60	76.5	65	67.1	79.5	57	.440	.490	.451	.460
23	29.452	29.561	29.571	29.528	47.5	52.5	41	54	60	43	52.3	62.5	42	.243	.296	.231	.256
24	29.517	29.384	29.272	29.391	53	63	63	58	76	68	67.3	79.5	39	.336	.402	.519	.415
25	29.203	29.220	29.172	29.198	65	70.5	65	66	75.5	67	69.5	77	66	.604	.678	.591	.624
26	29.166	29.155	29.193	29.171	66.5	65	63	69	72	65	68.7	79	64	.617	.559	.549	.575
27	29.204	29.241	29.215	29.220	58	63	58	59	67	59	61.7	72	55	.469	.522	.469	.486
28	29.183	29.218	29.328	29.243	64	64	54	68.5	79	58	68.5	82	57	.536	.529	.365	.476
29	29.464	29.544	29.506	29.504	54	55	41.5	57.5	63	44	54.8	65	43	.371	.327	.229	.309
30	29.460	29.401	29.289	29.383	50	60.5	60	56	74	67	65.7	79.5	41	.282	.347	.425	.351
31	29.144	28.972	28.900	29.005	60	65.5	63	64	72	65	67.0	73.5	63	.465	.541	.549	.518
Means.....	29.286	29.278	29.274	29.276	58.2	62.9	57.1	61.7	71.4	60.3	64.2	....	...	.449	.474	.434	.452
Sept. 1	29.074	29.264	29.361	29.233	43	42.5	41	44.5	46	44	44.8	47.5	41	.258	.226	.218	.227
2	29.411	29.342	29.218	29.390	41	51.5	49	41	56.5	53.5	50.3	58.5	31	.257	.328	.288	.290
3	29.173	29.045	28.941	29.053	52	66.5	68	55	77	75	69	80.5	49.5	.349	509	.591	.483
4	29.000	29.016	29.230	29.082	70	73	63	76	90	69	78.3	92	68	.652	.582	.495	.579
5	29.295	29.374	29.403	29.357	52	51	47	54	53	51	52.7	55	48	.362	.348	270	.326
6	29.365	29.330	29.213	29.302	49.5	53	52.5	50.5	54	53.5	52.7	55.5	47.5	.342	.389	.382	.371
7	29.111	29.035	29.006	29.050	54	64	58.5	55	70	60.5	61.8	74.5	50.5	.404	.516	.464	.461
8	29.150	29.323	29.409	29.294	52.5	57	49.5	58	69	52	59.7	73	51.5	.322	.366	.321	.316
9	29.469	29.374	29.370	29.404	51	62	57.5	55	75	63	64.3	77.5	49	.321	.382	.387	.363
10	29.379	29.303	29.288	29.323	55	68	63	58.5	78	68.5	68.3	81.5	54	.387	.550	.502	.479
11	29.151	29.070	29.212	29.144	63	57.5	44.5	65	63	47	58.3	71	41.5	.549	.400	.261	.403
12	29.569	29.688	29.720	29.659	40.5	42	36	42	46	36	41.3	48	34.5	.233	.215	.212	.220
13	29.737	29.601	29.503	29.613	39	47.5	48	40	50.5	50	46.8	54	32	.225	.289	.309	.274
14	29.428	29.414	29.506	29.449	52	58	53.5	54	60	55	56.3	62	47	.362	.456	.390	.406
15	29.635	29.685	29.665	29.661	50	53.5	41	51	58	42	50.3	60	41.5	.348	.350	.244	.314
16	29.587	29.474	29.350	29.470	37	53.5	52.5	39	56.5	53	49.5	58.5	32.5	.194	.370	.389	.317
17	29.132	29.065	29.020	29.072	54	65	57	55	68	57.5	60.1	70	50	.404	.577	.467	.482
18	29.103	29.270	29.425	29.266	50	51.5	46	452	58	48	52.7	65.5	47	.331	.378	.284	.332
19	29.529	29.492	29.374	29.465	42.5	55	55	3.5	58.5	57	53	59.5	38	.259	.387	407	.351
20	29.376	....	29.480	29.428	54	....	50	56	....	52.5	54.2	63	50	.391	....	.328	359
21	29.401	29.183	29.103	29.229	52	69	62	54	73	69	65.3	75.5	49.5	.362	.655	.462	.493
22	29.244	29.280	29.289	29.271	61	59	53	64	65	55.5	61.5	73	53	.497	.420	.370	.429
23	29.240	29.368	99.420	29.342	55	49.5	42	57	52	47.5	52.1	57.5	41.5	.407	.321	.195	307
24	29.422	29.342	29.269	29.344	44	54	49	46.5	67	58	57.1	69	39.5	.255	.245	.229	.243
25	29.203	29.082	29.179	29.121	49.5	57	57.5	55	70	54	59.7	71.5	51.5	.28	.293	.347	307
26	29.171	29.151	29.176	29.166	51	62	58	56	78	66	66.7	80.5	52	.308	.342	.376	.342
27	29.187	29.114	29.085	29.128	54	62	59	57	74	62	64.3	75	52	.376	.396	.460	.411
28	29.131	29.272	29.344	29.249	58	53	47	62	59	50	57	63	48.5	.429	.323	.283	.345
29	29.464	29.368	29.468	29.433	44	46.5	42	47	56	44	47.5	54	42	.249	.257	.241	.249
30	29.497	29.447	29.405	29.449	45.5	46.5	50	47.5	53	51	50.5	55	42	.279	.231	.348	.286
Means.....	29.321	29.292	29.318	29.314	50.6	52.8	51.5	53.0	59.7	54.5	56.8	...	....	.353	.384	.319	.358

of the north and northwestern lakes, at Marquette, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.683	.493	.780	.652	SW......	SW..	N......	4	12	2	5.0	S. 50 W.	0	0	0	......	....
.703	.400	.653	.585	SW......	S......	SW..	4	12	12	8.7	S. 26 W.	3	0	6	......	....
.796	.618	.627	680	S......	SW..	SW..	2	4	4	3.2	S. 36 W	8	3	10	......	....
....	......	.939	.939	SW.....	W....	W....	2	4	4	3.2	S. 81 W.	0	10	10	......	.23
.842	.575	.738	.709	NW.....	SE.....	N. ...	4	4	2	0.7	North....	4	0	0	......	....
.756	.786	.884	.808	NW......	E......	E......	2	4	12	4.9	N. 84 E.	0	10	10	......	.18
.896	.881	.919	.898	SW.....	S......	Calm..	25	2	0	8.8	S. 43 W.	10	5	10	......	.05
.886	.858	1.000	.914	Calm.....	N.	N.	0	2	4	2.0	North. ..	10	10	10	......	1.35
.942	.751	.845	.846	W..	SW....	NW...	2	2	2	1.6	West....	0	3	0	......	....
.843	.537	.745	.708	S...	S	S.....	4	12	4	6.7	South. ..	0	10	2	......	.40
.867	.486	.701	.684	SW.	SW....	SW ..	12	45	2	19.7	S. 45 W.	4	2	0	......	....
.734	.735	.874	.781	NW.....	NE....	S......	4	2	2	0.9	N. 33 W.	2	1	0	......	....
.780	.683	.833	.765	E.	S	S	2	2	4	2.1	S. 19 E..	2	10	10	......	.02
.734	.557	.681	.657	NW.. ...	N.	N.	12	12	2	8.0	N. 21 W.	8	0	0	......	....
.687	.357	.813	.619	NW.. ...	N. ...	N.	2	4	2	2.5	N. 11 W.	0	0	0	......	....
.763	.601	.805	.723	S........	S......	S......	2	2	12	5.3	South....	0	8	7	......	....
.805	.517	.825	.725	S........	SW....	W.. .	12	35	2	15.0	S. 36 W.	10	6	0	......	....
.850	.764	.812	.808	NW.	E.	Calm ..	2	2	0	0.5	N. 24 E..	0	0	0	......	....
.786	.375	.886	.682	W..	S......	Calm..	2	4	0	1.5	S. 27 W.	4	5	0	......	.48
.878	.721	.819	806	Calm.....	N.	W.. ..	0	2	2	1.0	N. 45 W.	1	2	3	......	....
.932	.740	.886	.852	Calm.....	E.. ...	Calm..	0	2	0	0.7	East.....	10	10	10	......	....
.851	.575	.731	.719	N.	SW....	Calm..	2	12	0	3.7	S. 53 W.	0	3	0	......	.62
.583	.572	.833	.662	N.	N.	SW....	12	4	4	4.5	N. 12 W.	0	0	0	......	....
.698	.448	.743	.629	SW.....	S ..	S......	12	4	4	6.3	S. 37 W.	0	3	10	......	....
.945	.769	.893	.869	SW.	Calm..	Calm..	12	0	0	4.0	North. ..	8	10	10	......	.18
.871	.712	.890	.824	Calm....	N......	Calm..	0	2	0	0.7	North. ..	0	4	10	......	.20
.939	.790	.939	.889	Calm	N. ...	Calm..	0	2	0	0.7	North. ..	10	10	10	......	....
.770	.747	.756	.757	SW.	N......	N.	4	12	4	4.5	N. 12 W.	2	0	0	......	....
.784	.568	.796	.716	N........	N. ...	N......	2	4	4	3.3	North....	0	0	0	......	....
627	.414	.642	.594	SW.	SW. ..	SW. ..	12	12	4	9.3	S. 45 W.	3	0	0	......	....
.780	.690	.890	.786	SW.	SW....	N......	4	4	4	1.9	S. 74 W	10	10	0	......	.22
.798	.625	.805	.743	....	....	.....	...	....	....	2.5	S. 50 W.	3.3	4.3	4.1	.... .	3.83
.878	.729	.756	.787	N........	N.	N.	25	25	4	18.0	North....	10	8	3	......	.02
1.000	.743	.702	.815	SW.....	E..	S.....	4	12	4	3.8	S. 53 E..	0	0	10	......	....
.805	.550	.681	.678	S...	S......	S ...	4	12	25	13.7	South. ..	6	0	0	......	....
.727	.413	.700	.613	SW......	SW....	SW...	12	35	2	16.3	S. 45 W.	3	3	10	......	....
.867	.864	.722	.817	N........	N......	N.	4	4	2	3.3	North.. .	10	10	10	......	.16
.928	.933	.932	.931	N..	N......	N.	4	2	2	2.7	North. ..	10	10	10	......	.80
.934	.704	.881	.843	Calm.....	S......	Calm..	0	4	0	1.3	South. ..	6	2	0	......	.10
.669	.432	.827	.642	W......	NW....	SW. ..	25	12	2	12.0	N. 78 W.	10	0	0	......	....
.743	.441	.650	611	S..	S......	S......	2	12	4	6.0	South....	0	0	0	......	....
.788	.574	.721	.694	S..	S......	S ...	4	12	4	6.7	South. ..	0	0	10	......	.44
.690	.696	.810	.798	S.	N......	NW...	4	25	12	10.7	N. 16 W.	10	10	10	......	.60
.871	.691	1.000	.854	N.	N......	N. ...	25	12	4	13.7	North. .	10	10	10	......	....
.910	.788	.856	.851	Calm.....	SE.. .	S.....	0	4	2	1.9	S. 30 E..	10	10	5	......	....
.867	.880	.901	.882	S	S......	N. ...	4	4	2	2.0	South.. ..	10	10	10	......	.13
.929	.727	.914	.856	N.	N......	N......	4	4	4	4.0	North....	10	3	0	......	....
.816	.810	.965	.863	S	SE.. ..	SE.. ..	2	2	4	2.5	S. 34 E .	7	10	10	......	1.06
.934	.843	.968	.915	SE......	SW. ..	N......	2	4	2	0.9	S. 33 E..	10	8	10	......	.19
.861	.786	.850	.832	NW....	NW....	N.....	4	4	2	3.1	N. 37 W.	8	10	0	......	....
.917	.788	.874	.859	NW.....	NE....	SE.. ..	2	4	12	3.6	S. 66 E..	2	1	2	......	....
.872	......	.829	.850	NW.....	....	Calm..	4	...	0	2.0	N. 45 W.	9	....	10	......	...
.867	.807	.653	.775	E.	S	S ...	4	12	12	8.3	S. 10 E..	10	7	2	......	....
.833	.680	.839	.784	E.	SE.. .	NW...	2	2	4	0.5	N. 24 E.	0	7	0	......	....
874	.827	.594	.765	NW.....	N.. ...	NW...	4	4	4	3.7	N. 30 E..	10	10	0	......	.72
.807	.371	.475	.551	W	W......	W......	4	12	12	9.3	West.. ..	0	0	3	......	....
.650	.400	.834	.628	SW......	S......	Calm..	12	25	0	11.5	S. 14 W.	0	8	0	......	....
.687	.357	.588	.514	SW......	SW....	SW. ..	12	12	4	9.3	S. 45 W.	2	0	0	......	....
.812	.472	.828	.704	S.........	S......	S......	4	25	4	11.0	South ...	0	0	2	......	....
.772	.647	.766	.735	W..	N......	N......	4	4	4	3.7	N. 27 W.	8	10	8	......	....
.772	.686	.836	.765	N...	N......	Calm..	4	4	0	2.7	North. ..	9	6	10	......	.06
.848	.574	.929	.783	E........	E.	E.	4	4	4	4.0	East.....	10	10	10	......	.02
.837	.674	.797	.769	....	....	....	....	..	...	1.4	S. 62 W	6.3	5.6	5.1	....	4.32

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
October 1	29.377	29.259	29.144	29.260	50	55	57.5	51	57	59	57.5	62	49	.348	.407	.454	.403
2	29.251	29.308	29.370	29.310	57.5	55.5	14	58	63	46.5	56	69	45	.467	.335	.255	.352
3	29.271	29.125	28.803	29.066	52.5	58	67	54	59	69	60.7	70.5	41	.375	.469	.637	.494
4	28.914	29.183	29.586	29.228	47.5	45	41	52	52	44	49.3	34.5	42.5	.270	.207	.218	.232
5	29.683	29.554	29.378	29.538	37	52	51	38	60	54	50.7	61	35	.207	.282	.335	.275
6	28.733	28.821	28.928	28.827	52	57.5	53.5	53.5	60	55.5	56.3	64	51.5	.368	.440	.377	.395
7	28.956	28.859	28.751	28.855	49.5	55	52	51	57.5	51	54.2	67.5	44.5	.334	.400	.362	.365
8	28.731	28.842	29.162	28.912	61	52.5	43	63.5	55	46	54.8	64	44.5	.503	.362	.238	.368
9	29.381	29.311	29.485	29.393	38	49	43	39	55	44	46	57	33.5	.216	.269	.264	.250
10	29.495	29.536	29.503	29.511	43.5	42	36	45	43	38	55.3	45.5	37	.263	.254	.186	.234
11	29.599	29.524	......	29.562	32.5	43	....	33.5	49	...	41.3	52	....	.171	.199	...	.185
12	29.299	29.146	29.136	29.194	37	47	46	39	56.5	53	49.5	58	28.5	.194	.198	.219	.204
13	29.216	29.301	29.436	29.318	47	42.5	40	50	44	41	45	50.5	39	.283	.252	.235	.257
14	29.550	29.597	29.630	29.592	34.5	35.5	34	36	38	36	36.7	39.5	33	.180	.175	.170	.175
15	29.587	29.358	29.127	29.357	30	40.5	38	31.5	45	38.5	38.3	46.5	27	.150	.194	.223	.189
16	28.986	29.109	29.316	29.137	40.5	40.5	39	42	43.5	39.5	41.7	46	36.5	.233	.225	.232	.230
17	29.444	29.405	29.291	29.380	36	42.5	43	37	47	45	43	49	35	.199	.213	.251	.221
18	29.125	28.979	29.186	29.097	44	55	39	46	62	45	51	65	43.5	.262	.354	.160	.259
19	29.340	29.542	29.579	29.487	35	34.5	31	36.5	37	33	35.5	40	31	.184	.175	.151	.170
20	29.230	28.827	28.672	28.910	34	41	46	36	45	49	43.3	50.5	29	.170	.205	.271	.215
21	28.731	28.752	28.915	28.799	43.5	48	37	47	49	39	45	57	38	.237	.322	.194	.251
22	29.134	29.249	29.447	29.277	34.5	36.5	34	36.5	39.5	35	37	41	34	.174	.177	.183	.178
23	29.554	29.465	29.228	29.416	31	36	38	32	38.5	40	36.8	41.5	30	.162	.179	.203	.181
24	29.161	29.285	29.573	29.273	37.5	32	26	39	36	28	34.3	41	25	.205	.129	.117	.150
25	29.829	29.850	29.732	29.804	24	28	16	28	31	19.5	26.2	34	15	.083	.119	.050	.084
26	29.426	29.291	29.294	29.337	24	32	32	25	33	33	30.3	36.5	16	.117	.168	.168	.141
27	29.257	29.228	29.235	29.240	32	39	36	34	42	37	37.7	43	28	.155	.199	.199	.184
28	29.188	29.164	29.674	29.342	36	38	37	37	39	37.5	37.8	41	33	.199	.216	.214	.210
29	29.372	29.392	29.306	29.357	37	43	43	38	46	44	42.7	48	33	.207	.238	.254	.236
30	29.057	29.079	29.217	29.118	43	52	41.5	45	58	42	48.3	59.5	41	.251	.309	.256	.272
31	28.956	29.085	29.351	29.131	42.5	42	34.5	44	45	36	41.7	51	33	.258	.228	.180	.220
Means.....	29.252	29.239	29.275	29.255	40.1	44.8	40.6	41.8	47.9	42.7	43.8	....	..	.239	.254	.242	.245
Nov. 1	29.384	29.328	29.383	29.365	33	33	32	34	34	33.5	33.8	40	31.5	.175	.175	.162	.170
2	29.322	29.217	29.133	29.224	32	35.5	32.5	32	37	34	34.3	44	28.5	.181	.188	.152	.173
3	29.360	29.452	29.428	29.420	31	35	32	34.5	37	34.5	35.3	38.5	31.5	.139	.178	.149	.155
4	29.234	29.212	29.312	29.252	36	38	37.5	37.5	39	38	38.1	52.	32.5	.192	.216	.218	.208
5	29.444	29.542	29.623	29.536	31.5	32	22	33	32	24	29.7	56	19.5	.160	.181	.095	.145
6	29.210	29.092	29.398	29.233	21.5	30.5	33	26.5	31	34	30.5	62	18	.109	.164	.175	.149
7	29.259	29.589	29.584	29.477	18	35.5	31	19	38	31	29.3	66	16	.087	.175	.174	.145
8	29.510	29.445	29.475	29.476	27	35	29	29	40	30.5	33.1	44	25.5	.124	.139	.143	.135
9	29.608	29.621	29.635	29.621	32	39	35	33.5	42	36	37.1	45	27	.136	.199	.191	.178
10	29.691	29.542	29.267	29.500	30.5	32	34.5	31.5	34	36	33.8	43	29	.158	.155	.180	.164
11	28.920	29.092	29.266	29.092	40	34	29.5	41	36	30	35.7	48	28	.235	.170	.157	.187
12	29.393	29.341	29.349	29.361	24	28	25	25	31	26	29	51.5	22.5	.117	.119	.123	.119
13	29.508	29.501	29.512	29.507	20.5	23.5	22.5	21.5	26	23	23.5	50	18	.093	.098	.114	.101
14	29.624	29.819	29.966	29.803	19.5	16	15	21	18.5	16.5	18.7	26	10.5	.088	.061	.096	.081
15	30.157	30.064	30.006	30.075	13	25	27	14	28	28	23.3	35	11	.067	.100	.136	.101
16	29.907	29.749	29.717	29.791	31	36	34	32	38	36	35.3	40	26	.162	.186	.170	.172
17	29.710	29.772	29.654	29.712	23.5	35.5	31	24	38	33	31.7	44	22	.120	.175	.151	.148
18	29.547	29.446	29.360	29.451	29	38	30	31	40	32	34.3	44.5	29	.137	.203	.144	.161
19	29.371	29.338	29.271	29.326	32.5	34	30	34	35	31	33.3	40	28	.165	.183	.155	.167
20	29.264	29.376	29.370	29.336	29	29	25	29.5	29	26	28.1	42	24	.154	.160	.123	.145
21	29.205	29.067	29.174	29.148	21	33	36.5	22	36	38.5	32.1	42	19	.101	.149	.190	.146
22	29.380	29.259	29.577	29.405	31	21.5	24.5	32	26	25	27.3	50.5	23.5	.162	.115	.126	.134
23	29.559	29.433	29.222	29.404	19	26	28	20.5	27.5	29.5	25.8	33.5	18	.086	.123	.136	.115
24	29.025	28.947	29.047	29.006	28	31	32.5	29	33.5	36	32.8	38.5	27	.142	.145	.140	.142
25	29.229	29.393	29.337	29.319	25.5	25	25	27	26	26	26.3	29	24	.121	.123	.123	.122
26	29.308	29.146	29.050	29.168	17.5	28	23.5	19	29	27	25	31	14	.079	.142	.085	.102
27	28.979	28.940	28.902	28.940	24.5	31	25	27	31	26	28	34	22.5	.103	.174	.123	.100
28	28.853	28.842	28.958	28.884	21	24.5	23.5	23	25.5	25	24.5	29	20	.090	.120	.109	.106
29	29.005	29.049	29.162	29.072	23	25.5	22.5	25	27.5	24	25.5	30	21	.100	.109	.105	.104
30	29.163	29.201	29.333	29.235	24	29	26.5	25.5	31	29	28.5	38	21	.112	.137	.115	.121
Means.....	29.401	29.358	29.382	29.380	25.7	30.7	28.5	27.8	32.5	29.9	30.1	...	....	.130	.152	.142	.141

of the north and northwestern lakes, at Marquette, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.				7 a. m.	2 p. m.	9 p. m.		
.929	.874	.908	.904	E.	SE	S.	4	4	4	3.2	S. 43 E.		10	10	10	......	....
.968	.571	.807	.762	W	E.	W	2	2	4	1.3	West.		1	0	1	......	....
.900	.939	.896	.912	E.	Calm.	S.	4	0	25	8.5	S. 9 E.		10	10	4	......	.10
692	.535	.756	.661	W	NW	W	35	45	4	25.8	N. 66 W.		3	6	0	......	....
.905	.546	.802	.751	S.	S	S.	2	4	4	3.3	South.		0	0	8	......	....
.899	.851	.840	.863	S.	SW.	Calm	2	4	0	1.9	S. 30 W.		10	10	0	......	.15
.894	.844	.867	.868	S.	SE.	SW.	2	2	4	2.1	S. 13 W.		4	10	10	......	1.25
.859	.837	.767	.821	S.	W.	W.	2	4	2	2.1	S. 71 W.		10	10	0	......	.07
.907	.620	.918	.815	SW.	S.	W.	4	2	4	2.8	S. 55 W.		0	8	0	......	....
.879	.916	.811	.869	W.	NW	N.	2	4	4	2.8	N. 35 W.		10	10	3	......	.16
.894	.572	......	.722	W.	W	Calm	2	2	0	1.3	West.		1	0	0	......	....
.816	.433	.544	.598	S.	S.	S.	2	25	12	13.0	South.		0	2	0	......	...
.786	.876	.912	.858	N.	N.	NW.	2	4	12	5.7	N. 30 W.		8	10	8	......	.08
.851	.765	.802	.806	N.	N.	N.	4	4	2	3.3	North.		8	10	10	......	....
.843	.645	953	.814	S.	SW.	W.	4	4	12	5.5	S. 66 W.		8	8	10	......	.20
.871	.831	.954	.889	W.	NW	NW.	4	4	2	3 1	N. 63 W.		8	10	10	......	.05
.903	.660	.840	.801	W.	W.	S.	4	4	4	3.0	S. 63 W.		5	4	3	......	....
.843	.659	.533	.678	S.	S.	NW.	4	12	12	3.8	S. 49 W.		1	0	0	......	.06
.853	.765	.800	.809	NW.	NW	NW.	25	12	2	13.0	N. 45 W.		10	10	0	......	....
.802	.864	781	.816	S.	S.	SW.	25	12	4	13.3	S. 4 W.		8	10	10	......	.. .
.734	.926	.816	.825	NW.	W.	NW.	4	4	12	6.3	N. 53 W.		8	8	0	......	.12
.804	.729	.898	.810	NW.	NW.	NW.	12	25	4	13.7	N. 45 W.		10	8	5	......	....
.896	.768	.820	.828	W.	E.	E.	4	4	2	0.7	East.		5	10	10	......	....
.861	.610	.768	.746	NW.	NW.	N.	4	25	12	12.8	N. 32 W.		10	6	10	......	.25
.543	.685	.475	.568	NW.	NW.	N.	4	4	2	3.1	N 37 W.		10	8	0	......	.24
.827	.893	.893	.871	W	SW.	S.	4	4	2	2.8	S. 55 W.		10	5	10	......	.03
.792	.744	.903	.813	W	E.	Calm.	2	2	0	..	....		10	10	10	......	....
.903	.907	.952	.921	E.	E.	S.	4	4	2	2.7	S. 76 E.		10	10	10	......	.22
.905	.767	.918	.863	W	E.	S.	4	2	2	1.0	S. 45 W.		6	8	10	......	.04
.840	.641	.956	.812	SE	Calm	N.	2	0	4	1.0	N 29 E.		10	2	2	......	....
.876	.762	.851	.830	S.	NW	N.	2	4	12	4.0	N. 12 W.		1	10	10	......	.05
.847	.743	.791	.794	....	....	....	...	....	..	2.6	N. 84 W		6.6	7.2	5.3	.....	3.07
1.895	.895	.841	.877	NE	N.	N.	12	12	12	11.3	N. 15 E.		10	10	10	......	.22
.000	.854	.747	.867	W	W	W	2	2	2	2.0	West.		10	5	5	......	....
.712	.807	.744	.754	NW.	NW	S.	12	2	2	4.2	N. 51 W.		10	7	10	......	....
.856	.907	.952	.905	S.	S.	N.	2	2	4	..	....		10	10	10	......	.42
.850	1.000	.734	.861	W	NW.	NW.	12	12	4	8.7	N. 64 W.		8	10	1	......	.09
.756	.947	.895	.866	SW.	S.	SE.	4	2	4	2.5	South.		10	10	1	......	.11
.845	.864	1.000	.903	S.	SW.	S.	2	2	2	1.9	S. 15 W.		1	5	0	......	....
.775	.557	.939	.757	SE	SW.	S.	2	2	2	1.6	South.		1	3	0	......	....
.653	.744	.900	.765	W	N.	NW.	2	2	2	1.7	N. 45 W.		6	3	10	......	....
.894	.792	.851	.849	NW.	S.	SE.	4	2	4	0.7	South.		10	10	10	......	.18
.912	.802	.946	.886	SE	NE.	NW.	4	4	4	1.3	N. 45 E.		10	10	10	......	....
.872	.685	.876	.811	W.	SW.	W.	2	4	4	3.1	S. 72 W.		9	8	10	......	....
.790	.694	.932	.805	NW.	NE.	Calm.	2	2	0	0.9	North.		10	10	8	......	.10
.783	.610	.748	.713	NW.	NW.	W.	2	2	4	2.4	N. 67 W.		10	8	10	......	....
.816	.655	.883	.784	W.	SE.	E.	2	2	2	0.7	S. 45 E.		1	10	4	......	....
.896	.811	.802	.836	SE.	S.	Calm	2	2	0	1.2	S. 23 E.		10	10	10	......	....
.834	.764	.800	.799	W	SE.	Calm	2	2	0	0.5	S. 24 W.		0	1	0	......	....
.788	.820	.794	.800	S.	S.	Calm	2	2	0	1.3	South.		10	8	0	......	....
.843	.898	.893	.878	W	NW.	NW.	4	4	2	3.1	N. 63 W.		10	10	10	......	.21
.945	1.000	.876	.940	N.	NW.	NW.	12	4	2	5.7	N. 15 W.		10	10	2	......	....
.860	.705	.813	.792	NW.	E.	NW.	2	2	12	4.2	N. 39 W.		1	0	5	......	....
.896	.815	.937	.882	NW.	NW.	NW.	25	12	12	16.3	N. 45 W.		10	10	10	......	.11
.780	.824	.834	.812	SW.	S.	SW.	12	4	12	5.8	S. 77 W.		8	10	3	......	....
.887	.756	.656	.766	S.	W.	N.	2	2	12	3.3	N. 11 W.		10	10	10	......	.34
.821	.876	.876	.857	NW.	N.	N.	12	4	4	6.2	N. 27 W.		10	10	10	......	....
.768	.887	.582	.712	W	S.	Calm	4	2	0	1.5	S. 63 W.		2	6	5	......	.16
.703	1.000	.876	.859	W	W.	W	2	2	12	5.3	West.		10	10	10	......	....
.730	.874	.809	.804	W	W.	Calm	4	2	0	2.0	West.		10	10	10	......	....
.746	.757	.803	.768	W	W.	W.	2	2	2	2.0	West.		10	10	10	......	....
.812	.788	.720	.773	NW.	NW.	NW.	2	4	12	6.0	N. 45 W.		10	10	10	......	.16
.824	.813	.831	.823	....	....	....	....	....	....	2.4	N. 54 W.		7.9	8.1	6.8	......	2.10

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				Temperature—Fahrenheit.									Vapor.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.						Elasticity, U. S inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.	Maximum.	Minimum.	7 a. m	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.498	29.576	29.656	29.576	21.5	22	18	24	24	19.5	21.5	25.5	16	.086	.095	.081	.087
2	29.542	29.412	29.240	29.398	17	22.5	16.5	18	25	18	20.3	26	14	.083	.091	.075	.083
3	29.149	29.250	29.266	29.221	20	23	16.5	21	26	18	21.7	27	13	.096	.089	.075	.086
4	29.237	29.181	29.200	29.239	7	16	15	8	18.5	16	14.1	21	4.5	.048	.061	.074	.061
5	29.136	29.109	29.264	29.169	15	17	6	17	17.5	7	10.5	23	4	.063	.088	.046	.065
6	29.401	29.500	29.559	29.486	5	10.5	11	5.5	11	12	16.1	19	1	.049	.063	.061	.057
7	29.513	29.505	29.361	29.459	10	17	14	11	18.5	16	15.1	22	5	.057	.077	.059	.064
8	29.251	29.279	29.410	29.310	13.5	23	25	15	25	27	21.3	28.5	11.5	.063	.100	.112	.092
9	29.408	29.274	29.265	29.315	26	32	31	29	34	33.5	32.1	38	24	.106	.155	.145	.135
10	29.179	29.036	28.909	29.041	23.5	36.5	34.5	26	40	41	35.7	46	19	.097	.170	.115	.127
11	28.965	29.053	29.313	29.110	32.5	35	31	38.4	40.5	33	37.1	42	29	.113	.153	.151	.139
12	29.424	29.328	29.172	29.308	....	28.5	32	26.5	30.5	33	30	41	26.5	....	.133	.168	.150
13	28.925	28.837	29.032	28.931	39.5	44	39	41	45	41	42.3	46	31	.223	.275	.212	.236
14	29.162	29.053	28.820	29.011	32	35.5	34	33	36.5	35.5	35	39	31	.168	.195	.176	.146
15	28.985	28.982	28.974	28.980	27	28.5	26	29	31	28	29.3	33	25	.124	.128	.117	.123
16	29.068	29.193	29.435	29.232	21.5	21	15	24	23	16	21	28	13.5	.086	.090	.074	.083
17	29.700	29.760	29.622	29.694	16	20	22	18	22	24	21.3	30	13	.067	.085	.095	.082
18	29.148	29.051	29.372	29.190	24	32	28.5	27.5	31	33	32.5	38	21.5	.089	.155	.105	.116
19	29.859	29.975	29.921	29.918	11	14	11	12.5	15.5	12	13.3	20	8.5	.054	.065	.061	.060
20	29.948	29.846	29.640	29.811	5	19.5	21	7	22	24	17.5	28.5	3	.032	.077	.079	.062
21	29.388	29.353	29.321	29.354	23.5	27	27	25	28	28.5	27.1	31	21	.108	.136	.130	.124
22	29.263	29.327	29.460	29.350	23	32	27	25.5	33	30	29.5	38	22.5	.095	.168	.113	.125
23	29.591	29.570	29.423	29.528	23	25.5	8	25	27.5	29	27.1	36	22	.100	.115	.142	.119
24	29.036	28.893	29.017	28.982	34.5	39	35	35	41	36	37.3	42	27	.193	.212	.191	.165
25	29.127	29.113	29.094	29.111	28.5	30	24	30	32	25.5	29.1	39	23	.139	.144	.112	.131
26	29.032	28.978	29.046	29.018	25	32	32	26.5	34	34	31.5	36	21	.118	.155	.155	.142
27	29.115	29.073	28.954	29.047	29.5	31.5	19.5	31	33.5	32	32.1	35	28.5	.146	.154	.134	.144
28	28.983	28.879	28.954	28.938	23.5	31.5	32	24.5	34	33	30.5	36	21	.106	.137	.168	.137
29	29.260	29.353	29.484	29.365	27	23.5	20	28	25.5	21.5	25	33	19	.136	.103	.091	.110
30	29.487	29.425	29.431	29.447	20	25.5	18	22	26	19	22.3	29	15	.085	.132	.087	.101
31	29.362	29.236	29.220	29.272	18.5	27	30	19.5	32	33	28.1	37	15.5	.089	.090	.132	.104
Means...	29.295	29.271	29.285	29.284	21.4	26.2	24.1	23.3	28.6	26.1	26.0	..	....	.097	.126	.114	.112
1863.																	
Jan. 1	29.253	29.107	29.034	29.164	25.5	32	32	27	36	32	25	38	24	.121	.129	.181	.143
2	28.965	28.784	28.786	28.845	35.5	37	36	38	39	37.5	38.2	43.5	31	.175	.194	.192	.187
3	28.922	28.898	28.891	28.903	40	42.5	36.5	41	44	38	41	45	36	.235	.252	.196	.227
4	28.736	28.716	28.808	28.753	32	29.5	2	33	32	27	30.7	36	24	.168	.134	.112	.138
5	28.950	28.868	28.943	28.920	25	27	22	26.5	31	23.5	27	33	21	.118	.101	.101	.106
6	29.031	29.110	29.364	29.168	13	16	14	15	18	15	16	22	12	.056	.067	.071	.064
7	29.499	29.405	29.539	29.481	10.5	15	14	12	17.5	15	14.8	20	8.5	.052	.057	.071	.060
8	29.543	29.522	29.522	29.532	15.5	20.5	4	16	22	5	14.3	25.5	1	.082	.041	.041	.054
9	29.491	29.338	29.107	29.312	15.5	24	31	16.5	27	32	25.2	34	-0.5	.076	.103	.162	.113
10	28.802	28.752	28.899	28.817	31	27	19	32	28	20	26.7	34	17.5	.162	.136	.092	.130
11	29.129	29.233	29.304	29.222	....	19	15	18.5	21	16	18.5	23	13.5	...	.080	.074	.077
12	29.246	29.375	29.628	29.416	21.5	27	21.5	22	29	24	25	31	13.5	.109	.124	.086	.106
13	29.483	29.205	28.698	29.462	21	27.5	34	24	28	35	29	37	20.5	.079	.144	.183	.135
14	28.864	28.933	29.099	28.998	24.5	20	15.5	27	22	17	22	30	13	.103	.085	.071	.086
15	29.232	29.281	29.342	29.285	16	15	11	17	16.5	12	15.2	20	8.5	.078	.063	.061	.067
16	29.305	29.300	29.382	29.329	6	8	5.5	7	9	6.5	7.5	11	-2.5	.046	.051	.044	.047
17	29.505	29.543	29.569	29.539	2	12	14	3	15	16	11.3	21	-2	.036	.041	.059	.045
18	29.486	29.428	29.531	29.482	18.5	25	27	20	27.5	30	25.8	32	14	.083	.106	.113	.100
19	29.660	29.708	29.690	29.683	24.5	32	31	26	34.5	33.5	31.3	37.5	23	.115	.149	.145	.136
20	29.611	29.508	29.462	29.527	32	33	31	32.5	35	32	36.5	36.5	29	.175	.162	.162	.166
21	29.467	29.467	29.429	29.454	28	35	41	29	36	32	32.3	38	25	.142	.191	.162	.165
22	29.308	29.293	29.457	29.352	32	35.5	31	34	37.5	31.5	34.3	39	29.5	.155	.182	.168	.168
23	29.565	29.500	29.279	29.448	25	28	28	26	29	30	28.3	34	24	.123	.130	.130	.127
24	28.993	29.007	29.266	29.088	32	36	31	34	38	33	35	40	27	.168	.186	.151	.165
25	29.433	29.412	29.450	29.432	25.5	34	35	27	36	33	32	39	23	.121	.170	.160	.150
26	29.447	29.415	29.447	29.436	16	27.5	20	17	30	22.5	33.2	33	14	.078	.121	.079	.092
27	29.458	29.441	29.414	29.439	24	24	18	26	27	20	24.3	30	16.5	.106	.095	.076	.092
28	29.246	29.138	29.068	29.147	13	28.5	24	15	33	27	25	35	10	.056	.105	.095	.085
29	28.956	28.883	29.025	28.954	25.5	31	28	28	31.5	29	29.5	34	23.5	.109	.168	.142	.139
30	29.197	29.217	29.068	29.157	23	26.5	24	24	28	26	26	30	20.5	.112	.126	.106	.114
31	29.202	29.291	29.228	29.237	13.5	13.5	12	15	15	12	14	24.5	11.5	.063	.063	.075	.067
Means.....	29.257	29.228	29.243	29.243	25.7	26.1	23.1	23.5	28.1	24.3	25.9	....	....	.110	.128	.118	.118

of the north and northwestern lakes, at Marquette, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.674	.738	.772	.728	NW	NW	SW	12	4	4	5.5	N. 59 W.	10	9	10	......	.02
.840	.694	.761	.765	S	SW	S	4	2	4	3.2	S. 9 W.	10	10	10	......	....
.855	.634	.761	.750	NW	NW	W	4	12	4	6.3	N. 53 W.	10	9	10	......	....
.777	.610	.829	.735	W	W	NW	4	4	2	3.2	N. 81 W.	0	5	2	......	....
.671	.919	.769	.783	W	NW	NW	4	12	25	13.3	N. 49 W.	10	10	10	......	....
.877	.899	.804	.860	NW	NW	SW	12	12	4	8.2	N. 53 W.	10	10	10	......	.62
.797	.765	.659	.740	W	SW	S	4	2	12	4.8	S. 22 W.	10	10	10	......	....
.734	.746	.761	.743	W	W	NW	2	2	2	1.8	N. 75 W.	2	10	10	......	....
.665	.792	.756	.737	S	SW	SW	2	2	2	1.8	S. 30 W.	10	2	0	......	....
.694	.688	.447	.609	W	S	S	2	2	25	9.0	S. 4 W.	3	3	4	......	....
.494	.605	.800	.633	SW	W	NW	2	2	4	2.1	N. 77 W.	2	10	10	......	.10
......	.785	.893	.829	NE	E	....	2	12	....	6.7	N. 84 E.	10	10	10	......	....
.867	.920	.824	.871	S	S	S	12	12	2	8.7	South	10	5	0	......	.26
.893	.901	.849	.881	W	Calm	SW	2	0	12	4.5	S. 51 W.	10	10	0	......	.08
.775	.736	.768	.759	W	SW	SW	4	2	4	3.1	S. 63 W.	10	10	10	......	....
.674	.730	.829	.744	N	N	N	12	12	25	16.3	North	10	10	10	......	.39
.682	.721	.738	.713	NW	S	S	4	2	4	1.4	S. 41 W.	10	5	10	......	....
.593	.792	.558	.614	S	S	N	45	2	35	4.0	South	7	6	10	......	....
.711	.739	.804	.751	N	NW	SW	12	4	4	5.5	N. 59 W.	10	10	10	......	.40
.538	.652	.610	.600	S	S	S	2	4	4	3.3	South	0	2	0	......	....
.809	.883	.829	.840	S	SW	Calm	4	12	0	5.0	S. 34 W.	10	10	0	......	....
.698	.893	.675	.755	W	NW	N	2	4	12	5.2	N. 18 W.	0	10	10	......	....
.746	.764	.887	.799	N	E	E	4	2	4	2.4	N. 56 E.	10	10	10	......	....
.953	.824	.900	.892	E	S	S	4	4	2	2.4	S. 34 E.	10	10	10	......	....
.836	.794	.812	.814	W	W	N	2	2	2	1.5	N. 63 W.	3	3	0	......	....
.818	.792	.792	.800	W	E	Calm	2	2	0	....	....	10	3	8	......	....
.841	.803	.744	.796	W	SW	SW	2	2	4	2.5	S. 65 W.	10	10	4	......	....
.807	.674	.893	.791	SW	E	Calm	2	2	0	0.5	S. 23 E.	10	10	10	......	.16
.883	.750	.787	.806	W	W	N	2	4	12	4.6	N. 27 W.	10	10	10	......	....
.721	.839	.845	.801	SW	SW	S	2	4	2	2.5	S. 34 W.	10	5	0	......	....
.847	.496	.703	.682	SE	S	S	4	25	25	17.7	S. 3 E.	0	5	4	......	....
.759	.728	.766	.751	....	....	....	....	....	....	1.7	S. 74 W.	7.7	7.4	7.1	......	2.03
.821	.610	1.000	.810	S	S	E	2	4	4	2.4	S. 34 E.	5	6	10	......	....
.765	.816	.856	.812	S	S	S	4	12	2	6.0	South	10	10	10	......	.14
.912	.876	.859	.882	S	S	Calm	2	4	0	2.0	South	10	6	10	......	....
.893	.744	.761	.799	NW	W	Calm	2	4	0	1.8	N. 75 W.	10	2	5	......	.12
.818	.582	.800	.733	W	W	W	2	2	2	5.3	West	8	8	10	......	....
.648	.682	.823	.717	NW	NW	SW	12	25	4	12.5	N. 52 W.	10	10	10	......	....
.706	.597	.823	.708	SW	SW	SW	4	2	12	6.0	S. 45 W.	6	10	10	......	....
.914	.750	.750	.804	W	NE	W	2	2	4	1.6	N. 73 W.	10	2	0	......	.34
.831	.704	.896	.810	SW	S	S	4	4	4	3.7	S. 14 W.	10	5	10	......	....
.896	.883	.850	.876	SW	W	NW	2	12	12	7.5	N. 71 W.	10	10	10	......	.15
......	.712	.829	.770	W	W	E	4	4	2	2.0	West	10	10	0	......	....
.930	.775	.974	.859	S	W	N	2	2	2	0.7	West	10	10	0	......	....
.610	.942	.898	.816	E	E	SE	4	4	12	6.2	S. 63 E.	10	10	10	......	.06
.704	.721	.752	.725	W	SW	SW	4	12	4	6.3	S. 54 W.	5	10	10	......	....
.834	.671	.804	.773	W	NW	NE	4	12	25	9.0	N. 11 E.	10	10	3	......	....
.769	.784	.764	.772	N	N	W	25	12	4	12.5	N. 6 W.	10	10	10	......	.40
.730	.475	.659	.621	SW	S	S	4	12	12	5.8	S. 9 W.	0	9	5	......	....
.776	.707	.675	.719	S	S	S	4	2	12	6.0	South	2	7	10	......	....
.815	.744	.756	.771	W	N	E	2	2	4	1.0	N. 45 E.	10	10	10	......	....
.945	.797	.896	.879	SE	E	E	2	4	4	3.2	S. 81 E.	10	10	10	......	.08
.887	.900	.896	.894	W	SE	Calm	2	2	0	0.5	S. 22 W.	8	10	10	......	....
.792	.809	.948	.849	S	W	N	2	2	4	1.0	N. 45 W.	10	10	10	......	.06
.8[illegible]6	.782	.782	.813	N	E	E	2	4	12	5.5	N. 83 E.	10	10	5	......	....
.893	.811	.800	.834	E	S	SE	4	4	4	3.2	S. 45 E.	10	6	10	......	.20
.821	.802	.850	.824	Calm	S	SW	0	2	12	4.5	S. 39 W.	8	0	0	......	....
.834	.729	.658	.740	NW	NW	SW	2	4	4	2.4	N. 79 W.	6	10	10	......	....
.754	.644	.702	.700	N	NW	Calm	4	2	0	1.8	N. 15 W.	10	10	10	......	....
.648	.558	.644	.616	W	S	S	2	2	4	2.1	S. 19 W.	2	0	10	......	....
.711	.948	.887	.848	W	E	E	2	2	12	4.0	East	10	10	8	......	.32
.868	.826	.754	.816	NW	S	SW	12	2	35	12.7	S. 61 W.	10	10	10	......	....
.734	.734	1.000	.822	NW	NW	S	12	4	2	5.0	N. 51 W.	8	10	6	......	....
.804	.753	.817	.791	....	....	....	....	....	....	1.3	S. 74 W.	8.3	8.4	8.1	......	1.96

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	28.687	28.646	29.060	28.797	23	22.5	8	25	25	8.5	19.5	28	5	.100	.091	.057	.082
2	29.390	29.494	29.444	29.442	-8.5	— 2	-11	—8	-1	-10.5	—6.5	3	-14.5	.024	.028	.020	.024
3	29.654	29.773	29.816	29.747	—11	0	-13	-10.5	1	-13	—8.1	4.5	-20	.009	.032	.023	.021
4	29.834	29.761	29.626	29.740	0.5	11.5	15	1	13.5	16.5	10.3	20	-22	.039	.050	.069	.053
5	29.499	29.461	29.491	29.483	15	21	14	15.5	23	15.5	18	24	12.5	.080	.090	.065	.078
6	29.351	29.298	29.099	29.249	10	24	21.5	11	27	25	21	30.5	2.5	.057	.095	.086	.079
7	29.131	29.201	29.495	29 275	22	29	14	23.5	34.5	17	25	36	14.5	.101	.097	.048	.082
8	29.789	29.793	29.777	29.753	6	15	15.5	7	16.5	17	13.5	20.5	3.5	.046	.069	.071	.062
9	29.613	29.286	29.263	29.387	13.5	17	22	15	18	23	18.7	26	11.5	.063	083	.107	.084
10	29.506	29.584	29.584	29.558	8.5	25	20.5	10	28	22.5	20.1	30	7	.046	.100	.087	077
11	29.482	29.465	29.532	29.496	8.5	22	14	9	24	16.5	16.5	25.5	6	.058	.095	054	.069
12	29.559	29.555	29.594	29.569	...	13	11.5	14.5	19	13	15.5	21	10	....	.044	.055	.049
13	29.621	29.582	29.492	29.565	1	22	21	2	25	23.5	16.8	31.5	—1	.034	.084	.084	.067
14	29.050	28.614	28.582	28.748	29.5	35	36	31	36.5	38	35.1	40	20.5	.146	.184	.186	.172
15	29.178	29.286	29.599	29.354	14	19.5	12	15	22	14	17	25	10	.071	.077	.052	.066
16	29.749	29.664	29.533	29.648	11.5	19	18	12.5	22	21	18.5	28	9	.062	.069	.080	.070
17	29.381	29.294	29.198	29.291	25.5	35	34.5	28	39	39	32	43.	18	109	.152	.141	.134
18	29.060	29.043	29.062	29.055	35.5	40.5	36	37	43	38	39.3	44.5	34	.188	.220	.186	.198
19	29.155	29.155	29.227	29.179	27	24.5	21.5	30	26	24	26.7	31.5	20	.113	.115	.086	.104
20	29.422	29.518	29.731	29.590	14	16.5	12	15	19	13.5	15.8	22.5	10.5	.071	.063	.058	.061
21	29.909	29.921	29.839	29.889	12	13	6.5	13	14	8	11.7	18.5	4.5	.063	.067	.041	.057
22	29.703	29.658	29.635	29.665	-6	18	11	—5	20	12	9	24	10.5	.021	.076	.061	052
23	29.551	29 477	29.392	29.473	16	28	25.5	17	34	30	27	37	9.5	.078	.085	.086	.083
24	29.407	29.391	29.368	29.388	26	32	32	28	35	32	31.7	36.5	24.5	.117	.142	.181	.146
25	29.354	29.339	29.334	29.342	23.5	36.5	27	24.5	40	30	35.5	41	21.5	.115	.170	.113	.132
26	29.077	28.872	29.021	28.990	32	30	25	32	30.5	26	29.5	34	23	.181	.161	.123	.155
27	29.278	29.403	29.491	29.390	21.5	27	23	22.5	29	24	25.1	31	19	.103	.124	.112	.113
28	29.390	29.273	29.170	29.277	25	38.5	32	26	40	33	33	41	21.5	.123	.214	.168	.168
Means..	29.406	29.421	29.441	29.424	14.6	22.9	18.1	18.0	24.7	19.9	20.6	....	.....	.081	.103	.058	.079
March 1	29.109	29.160	29.252	29.173	28	32	26	29.5	35	28.5	31	38	25	.136	.142	.112	.130
2	29.275	29.342	29.447	29.354	27.5	26	18	29	29	21	26.3	32	17.5	.133	.106	.065	.101
3	29.518	29.564	29.605	29.562	15.5	17	11	17	19.5	12	16.1	23	10	.071	.066	.061	.066
4	29.712	29 720	29.612	29.681	9	18.5	8.5	10	22	11.5	14.5	28	7	.054	.061	.029	.048
5	29.165	29.005	28.804	28.991	19	28	28.5	21	29	30	26.7	32	7.5	.080	.142	.139	.120
6	29.142	29.268	29.434	29.281	17	20	11	18.5	23.5	12.5	18.1	37.5	7	.077	.068	.054	.066
7	29.390	29.313	29.189	29.297	7	22	21	8.5	26	21.5	18.7	33.5	6	.043	.072	.107	.074
8	28.937	28.888	28.903	28.909	21	26	5	23	29	6	19.3	32	4	.090	.106	.043	.079
9	29.082	29.224	29.247	29.187	8	13.5	6.5	10	16.5	9	11.8	23	2	.040	.045	.030	.038
10	29.010	28.988	29.188	29.062	16.5	32	23.5	18	36	25	26.3	39	5	.075	.129	.108	.104
11	29.371	29.377	29.452	29.400	11	16	3	12.5	19	3.5	11.7	23.5	1.5	.054	.056	.044	.051
12	29.543	29.613	29.522	29.559	5.5	15.5	11.5	6	19.5	14	16.5	24	—0.5	.050	.042	.044	045
13	29.571	29.508	29.394	29.491	13	23	10	15	27	12	18	29.5	8	.056	.078	.046	.060
14	29.257	29.190	29.193	29.213	20	30	28.5	22.5	33.5	29.5	28.5	35	9	.079	.127	.145	.117
15	29.191	29.291	29.358	29.280	25	31	28.5	26	32.5	31	29.8	35.5	24	123	.157	128	136
16	29.417	29.311	29.264	29.364	24	35	32.5	26	38.5	35	33.1	42	23.5	.106	.158	.152	.138
17	29.344	29.492	29.630	29.488	32	26	19.5	33.5	28	21	27.5	35	18.5	.162	.117	.088	.122
18	29.757	29.807	29.772	29.778	18.5	25	18.5	20	28	19.5	22.5	32.5	16.5	.083	100	.089	.090
19	29.792	29.711	29 703	29.735	8.5	29	20.5	9	34	22	21.7	37.5	2	.05[illegible]	.103	.093	.084
20	29.714	29.613	29.503	29.610	13.5	31.5	27.5	14	35.5	29.5	26.3	37	11	.073	.131	127	.043
21	29.387	29.372	29.403	29.387	26	34.5	26	28	39	28	31.3	42	25.5	.117	.141	.117	.125
22	29.462	29.473	29.397	29.444	27	33.5	32.5	28	35	33	32	36	24	.136	.186	.178	.166
23	29.311	29.208	29.240	29.253	33.5	35.5	34	34	36	34	34.7	38	32	.186	.201	.196	194
24	29.024	28.732	29.066	28.940	33	35	37	33	39	38.5	36.8	42	26	.188	.152	.201	.180
25	29.148	29.190	29.252	29.196	23	23.5	21	25	26	23	24.7	31.5	19	.100	.098	.090	.096
26	29.304	29.332	29.351	29.329	21.5	27.5	19.5	22	32	21	25	34.5	19	.109	.098	.088	.098
27	29.281	29.193	29.189	29.221	24	35	33.5	26	42	34	34	44.5	18	.106	.113	.186	.135
28	29.337	29.344	29.438	29.373	13	15	18	14.5	17	19.5	17	27.5	11.5	.061	.063	.081	068
29	29.541	29.652	29.621	29.604	17	26	13	20.5	28	13.5	20.7	34	10	.054	.117	.072	.081
30	29.460	29.284	29.298	29.347	25.5	36	32	29	42	33	34.7	46.5	10	.098	.134	.168	.133
31	29.501	29.515	29.452	29.489	18	41	42	20.5	50	51.5	40.7	24.5	4.5	.070	.139	.143	.117
Means..	29.357	29.341	29.328	29.347	19.4	27.2	21.5	20.6	30.5	23.9	25.0	....	.....	.092	.111	.104	.102

of the north and northwestern lakes, at Marquette, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.746	.684	.890	.773	S	W	N	2	35	25	14.0	N. 57 W.	10	10	5	......	....
.794	.663	765	.747	W	W	W	2	25	12	13.0	West	10	8	0	......	.33
.325	.707	1.000	.677	NW	NW	W	12	4	2	5.8	N. 50 W.	0	5	2	......	....
.853	.629	.748	.736	SE	SE	E	2	12	4	5.7	S. 54 W.	10	10	10	......	....
.913	.730	.739	.794	S	NW	W	2	2	2	1.2	S. 80 W.	10	8	10	......	.10
.797	.644	.674	.705	SW	S	S	4	4	35	14.0	S. 4 W.	0	8	10	......	....
.800	.485	.569	.598	S	SW	W	4	12	4	6.0	S. 45 W.	10	0	0	......	....
.769	.748	.752	.756	NW	N	E	4	2	12	3.4	N. 62 E.	10	10	10	......	....
.734	.840	.864	.812	E	SW	W	4	2	4	0.7	S. 45 W.	10	10	10	......	.32
.687	.655	.725	.689	W	S	Calm	2	2	0	1.0	S. 45 W.	2	8	0	......	....
.822	.738	.582	.737	W	NW	N	2	4	2	2.3	N. 45 W.	3	10	10	......	.08
......	.492	.716	.604	N	N	N	4	2	2	2 7	North	10	10	10	......	....
.718	.624	.669	.669	W	S	E	2	4	12	3.6	S. 68 E.	0	5	10	......	....
.841	.853	.811	.835	SE	S	S	12	12	12	11.2	S. 15 E.	10	7	5	......	.11
.823	.652	.635	.703	W	SW	NW	4	12	4	5.4	S. 69 W.	8	7	8	......	....
.807	.584	.712	.701	W	S	SW	2	2	12	5.0	S. 45 W.	10	6	10	......	....
.711	.636	.590	.645	S	S	S	2	2	4	2.7	South	5	8	8	......	....
.854	.791	.811	.818	S	S	S	12	2	2	5.3	South	8	10	4	......	...
.675	.815	.674	.721	NW	N	N	2	4	12	5.9	N. 5 W.	10	10	10	......	....
.823	617	.721	.720	W	N	NW	12	12	4	7.0	N. 45 W.	10	10	10	......	.15
.810	.816	.665	.763	N	E	Calm	4	4	0	1.8	N. 43 E.	10	10	3	......	....
.627	.702	.804	.711	S	SE	Calm	2	2	0	1.2	S. 23 E.	0	0	0	......	....
.834	.432	.517	.594	S	S	S	2	4	2	2.7	South	2	7	2	......	....
.768	.698	1.000	.822	SW	E	Calm	2	2	0	0.5	S. 22 E.	10	10	2	......	....
.870	.688	.675	.721	SW	S	N	2	2	2	0.7	S. 45 W.	5	8	10	......	....
1.000	.947	.876	.941	E	NE	NE	4	12	12	9.0	N. 51 E.	10	10	10	......	.56
.862	.775	.868	.835	NW	N	S	4	4	2	1.8	N. 30 W.	10	10	10	......	....
.876	.864	.893	.844	SE	S	Calm	2	2	0	1.2	S. 23 E.	3	8	10	......	....
.822	.698	.753	.757	....	....	....	....	....	....	1.2	S. 60 W.	7.0	7.9	6.6	.....	1.65
.834	.698	.716	.749	W	N	N	4	2	2	1.9	N. 45 W.	8	10	8	......	.14
.831	.665	.570	.688	NE	N	N	12	12	12	11.2	N. 15 E.	10	10	10	......	....
.753	.623	.804	.726	N	NW	N	2	4	4	3.1	N. 18 W.	10	10	10	......	....
.791	.517	.403	.570	NW	N	W	4	4	2	2.8	N. 35 W.	10	4	0	......	....
.712	.887	.836	.811	S	S	S	4	12	2	6.0	South	10	10	10	......	.44
.765	.540	.711	.675	W	NW	W	4	12	4	6.2	N. 63 W.	10	10	10	......	....
.671	.515	.929	.705	W	SE	SE	4	12	2	3.8	S. 31 E.	3	0	4	......	....
.730	.665	.760	.718	S	NW	W	2	4	2	1.6	N. 80 W.	10	10	0	......	....
.582	.500	.461	.517	W	SW	SW	12	12	2	8.0	S. 66 W.	5	5	0	......	....
.561	.610	.809	.660	SW	SW	N	4	4	4	1.9	S. 74 W.	5	8	10	......	....
.711	.541	.869	.709	W	NW	W	2	12	2	5.0	N. 56 W.	10	6	0	......	...
.879	.402	.540	.607	W	W	SW	2	12	4	5.8	S. 81 W.	3	0	0	......	....
.648	529	.610	.595	W	N	S	4	4	2	1.5	N. 63 W.	10	2	0	......	....
.658	.659	.888	.731	Calm	E	SE	0	2	4	1.8	S. 60 E.	10	10	10	......	....
.876	.848	.736	.820	E	E	Calm	4	2	0	2.0	East	10	10	10	......	.05
.754	.677	.747	.726	W	SE	Calm	2	2	0	0.5	S. 22 W.	3	2	4	......	....
.841	.768	.783	.797	N	N	N	4	4	2	3.3	North	10	10	0	......	....
.776	.655	.847	.759	N	E	Calm	2	2	0	1.0	N. 45 E.	10	3	0	......	....
.894	.524	.790	.705	E	E	Calm	2	2	0	1.3	East	0	0	0	......	....
.908	.833	.778	.843	SE	SE	SE	2	4	2	2.7	S. 45 E.	3	8	10	......	....
.768	.590	.768	.708	S	SW	SW	2	2	2	1.8	S. 30 E.	10	10	0	......	....
.883	.947	.946	.925	SE	NW	SE	2	2	2	0.7	S. 45 E.	10	10	10	......	.72
.947	.949	1.000	.965	SE	SE	Calm	2	2	0	1.3	S. 45 E.	10	10	10	......	....
1.000	.636	.860	.832	NW	NW	W	2	2	4	2.4	N. 67 W.	10	8	2	......	....
.746	.694	.730	.723	NW	NW	NW	4	4	12	6.7	N. 45 W.	10	10	10	......	.09
.830	.547	.783	.720	NW	N	Calm	4	2	0	1.8	N. 30 W.	10	2	0	......	....
.754	.420	.947	.707	N	S	Calm	2	4	0	0.7	South	8	10	10	......	....
.730	.671	.772	.724	NW	NW	NW	12	25	25	20.7	N. 45 W.	10	10	10	......	.. .
.492	.768	.907	.722	NW	N	Calm	12	2	0	4.5	N. 39 W.	10	4	0	......	.30
.611	.500	.893	.668	SW	S	NW	4	2	4	2.0	S. 70 W.	10	8	10	......	...
.635	.386	.375	.465	NW	NW	Calm	12	12	0	8.0	N. 45 W.	10	8	0	......	.19
.766	.638	.792	.732	....	....	....	....	....	....	2.0	N. 54 W.	8.3	7.0	5.0	......	1.93

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.							Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.	Maximum.	Minimum.		7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°					
April 1	28.953	28.736	28.305	28.665	18	41	42	20.5	50	51.5	40.7	54	0		.070	.139	143	.117
2	28.721	28.827	29.102	28.883	30.5	33.5	30	35.5	39	32	35.5	43.5	29.5		.112	.120	.144	.125
3	29.559	29.664	29.629	29.631	22	31	15	24.5	32	16.5	24.3	33	13.5		.089	.152	.069	.103
4	29.592	29.467	29 409	29.489	29	42.5	36.5	30.5	51.5	37	39.7	55	13.5		.143	.154	.209	.169
5	29.320	29.584	29 470	29.458	36.5	35	33	40	37	35	37.3	43.5	32.5		.170	.178	.162	.170
6	29.593	29.690	29.700	29.661	26	32	25	28	35	28	30.3	36.5	25		.117	.142	.100	.120
7	29.757	29.723	29.720	29.733	23.5	30	18.5	25.5	34	20.5	26.7	37	18		.103	.128	.078	.103
8	29.714	29.655	29.567	29.645	18	34	25	19.5	40	27	28.8	44	10		.081	.118	.112	.104
9	29.485	29.387	29.234	29.369	27	40.5	36.5	32	50	41	41	54	24		.090	.128	.158	.125
10	29.108	29.036	29.035	29.060	39	46	37.5	42	54	39.5	38.5	58.5	38		.199	.206	.198	.201
11	29.091	29.210	29.390	29.231	34.5	33	29.5	35.5	34.5	30	33.3	37	28		.187	.169	157	.171
12	29.534	29.548	29.427	29.503	32	34	26	33.5	37.5	28.5	33.2	40.5	25		.162	.150	.112	.141
13	29.232	29.415	29.443	29.363	32	41.5	37	34	49.5	42.5	42	56	25.5		.155	.158	.149	.154
14	29.467	29.413	29.371	29.417	35	44.5	38	40	53	45	46	59	30		.160	182	.138	.160
15	29.302	29.337	29 328	29.322	34.5	44.5	32.5	38	54	36.5	42.8	61	35.5		.154	.168	.132	.151
16	29.325	29.300	29.295	29.307	30.5	52	41	34	66	48	49.3	67	30		.130	.203	.166	.166
17	29.255	29.180	29.140	29.192	40.5	53.5	43.5	45	65.5	50	53.5	67	36.5		.200	.244	.197	.214
18	29.069	29.028	29.074	29.057	46.5	56	44.5	51.5	68.5	50	56.7	70.5	44		.250	.283	.221	.251
19	29.134	29.255	29.381	29.257	43	44.5	42	45	47	43	45	49	41.5		.251	.260	.254	.255
20	29.419	29.513	29 550	29.494	38.5	40	38	40	40.5	39	39.8	41	37.5		.214	.241	.216	.224
21	29 569	29.590	29.466	29.542	37.5	42	39.5	39	43	41	41	45.5	35		.205	.254	.223	.227
22	29.534	29.493	29.441	29.489	39.5	50	40.5	41	53.5	42	45.5	60	30		.223	.315	.232	.257
23	29.412	29.360	29.301	29.358	35	53.5	39	37	63	43.5	47.8	68	31.5		.178	.284	.179	.180
24	29.406	29.536	29.505	29 482	41	44	31	44	50	35	43	54	34		.218	.209	128	.185
25	29.573	29.541	29.500	29.538	30	43.5	29	32	50	31	37.3	54.5	25		.144	.197	.137	.159
26	29.475	....	29.426	29.451	31	51	39.5	35	65	45	48.3	66.5	27.5		.128	.189	.170	.162
27	29 368	29.288	29.256	29.304	41	52	39	45	68	43	52	72.5	36		.205	.177	.186	.189
28	29.339	29.345	29.312	29.332	36	42.5	34	39	48	36	41	51.5	35.5		.173	.200	.170	.181
29	29.298	29 344	29.325	29.322	41	46	37.5	31	57	42.5	44.5	61	27		.139	.166	.159	.155
30	29.352	29.258	29.160	29.257	35.5	52	47.5	39	64.5	57.5	53.7	66	29.5		.162	.223	.197	.194
Means.....	29.399	29.357	29.342	29.366	33.1	42.8	34.9	36.3	50.0	39.2	41.5	....	....		.163	.184	.163	.170
May 1	29.110	29.155	29.337	29.194	48	48	36	58	54	38.5	50.2	78.5	37		.203	.256	.179	.213
2	29.438	29.460	29.400	29 433	33	38.5	31.5	35	43	34.5	37.5	45	32		.162	.175	.143	.160
3	29.372	29.356	29 328	29.352	36.5	39	34.5	38	41	35.5	38.2	43	33.5		.196	.212	.187	.198
4	29.285	29.313	29.330	29.313	36	39.5	35.5	37.5	42	39	39.5	47	34.5		.192	.211	.162	.188
5	29 447	29.534	29.490	29.490	35	40	33.5	37	44.5	39	40.2	47	34.5		.178	.195	.134	.172
6	29.534	29.516	29.434	29.495	36	46	34	40	56.5	38	44.8	62	31		.160	.173	.144	.159
7	29.423	29.370	29.272	29.355	35.5	50.5	46	38	63	57	52.7	67	28		.171	.203	.166	.180
8	29.257	29.149	29.292	29.233	45	57	47	51.5	80	55	62.5	82	49.5		.106	.160	.165	.144
9	29.366	29.310	29 246	29.307	43	48.5	40.5	46.5	61	46	51.2	66.5	42		.232	.177	.181	.197
10	29.206	29.247	29.314	29.256	41	45.5	43.5	43	49	45	45.7	52.5	40.5		.231	.259	.263	.251
11	29.395	29 404	29.350	29.383	41	47	45	44	53	50	49	62	35		.218	.244	.258	.240
12	29.310	29.373	29.374	29.362	45	52	40	49	59	43.5	50.5	60	43		.247	.296	.202	.248
13	29.358	29.352	29.402	29.371	39	46	38.5	41	53	40.5	44.8	57.5	36.5		.212	.219	.208	.213
14	29.486	29.534	29.477	29.499	40	46	35.5	42.5	53	38.5	44.7	56	34.5		.215	.219	.169	.201
15	29.220	29.150	28.968	29.079	39.5	45	45	46	48.5	47	47.2	52.5	31.5		.158	.253	.273	.228
16	29.011	29.052	29.100	29.054	40	42.5	39	41	47.5	40	42.8	50.5	38		.235	.207	.225	.222
17	29.301	......	29.426	29.363	40	....	38	42	....	43	42.5	55	38		.221	....	.164	.193
18	29.458	29.385	29 285	29.376	38	53	45	41	63	49.5	51.2	67	34		.190	.270	.240	.233
19	29.265	29.093	29.020	29.126	48	65	62.5	56	83	78	72.3	86	46		.230	.376	.359	.322
20	29.100	29.127	29.147	29.125	62	68.5	64	74	90	70	80.7	92.5	70.5		.396	.408	.409	.404
21	29.313	29.328	29.341	29.327	57.5	65	58.5	64	89	70	74.3	90	61		.388	.296	.339	.341
22	29.393	29 333	29.298	29.341	58.5	67	63	67.5	85	72	74.8	87	61		.372	.554	.455	.460
23	29.236	29.156	29.132	29.175	56	63.5	53	60	78	56.5	64.8	79	55.5		.396	.392	.356	.381
24	29.129	....	29.218	29.174	51.5		48	54	....	50.5	52.3	68	48.5		.348	....	.302	.325
25	29.285	29.342	29.376	29.334	49	55.5	45	51.5	59	46	52.2	62	45		.315	.395	.286	.332
26	29.402	29.433	29.465	29.433	47	55	48	48	64.5	51	54.5	66	42		.310	.307	.296	.304
27	29.507	29.497	29.452	29.485	50	59	49.5	52	65	54	57	74	47		.334	.420	.295	.350
28	29.440	29.412	29.324	29.392	48	55	54	50.5	63	60	61.2	71.5	42		.302	.327	.338	.322
29	29.230	29.167	28.994	29.098	53	60	55	56.5	70.5	60	62.5	77	50		.353	.378	.367	.369
30	28.898	28.860	28.876	28.878	50	54.5	49.5	53.5	64	52	66.5	65	59		.315	.300	.322	.316
31	28.847	28.785	28.744	28.792	44.5	49.5	46	46.5	55.5	49	50.3	60	44		.268	.276	.271	.272
Means....	29.293	29.286	29.298	29.292	44.6	51.7	45.3	49.2	61.2	50.2	53.5	....	...		.253	.291	.250	.265

of the north and northwestern lakes, at Marquette, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.				7 a. m.	2 p. m.	9 p. m.		
.635	.386	.375	.465	S.	SW.	SW.	12	2	25	12.3	S. 31 W.		10	0	0	......	....
.543	.506	.794	.614	NW.	NW.	N.	12	4	4	6.3	N. 37 W.		3	8	10	......	....
.680	.896	.748	.775	N.	N.	Calm.	4	2	0	2 0	North.		10	10	0	......	....
.839	.405	.951	.732	S	S	SE.	4	4	2	3.2	S. 9 E.		0	0	0	......	....
.683	.807	.797	.761	Calm.	NW.	NW.	0	4	4	2.7	N. 45 W.		10	10	10	......	....
.768	.698	.655	.707	NW.	N.	NW.	4	12	4	6.2	N. 18 W.		8	0	0	......	....
.750	.628	.707	.695	NE.	N.	NW.	12	4	2	5.9	N. 27 E.		5	0	0	......	....
.772	.476	.761	.670	Calm.	Calm.	Calm.	0	0	0	0.0	Calm		0	0	0	......	....
.496	.355	.609	.487	S.	SE.	S.	2	12	4	5.6	S. 30 E.		2	8	10	......	....
.744	.493	.818	.685	Calm.	NW.	Calm.	0	2	0	0.7	N. 45 W.		8	10	10	......	....
.899	.845	.946	.893	NW.	N.	N.	4	4	4	3.7	N. 15 W.		10	10	0	......	....
.841	.669	.716	.742	N.	S.	Calm.	4	2	0	0.7	North.		0	0	0	......	....
.792	.444	.545	.594	SE.	SE.	S	2	2	4	2.4	S. 23 E.		0	6	10	......	....
.645	.452	.459	.519	Calm.	SE.	Calm.	0	2	0	0.7	S. 45 E.		0	3	10	......	....
.673	.405	.614	.564	Calm.	Calm.	E.	0	0	2	0.7	East.		5	0	0	......	....
.664	.318	.494	.492	Calm.	SE.	S.	0	4	2	1.8	S. 30 E.		0	5	2	......	....
.680	.383	.548	.537	SE.	S.	S.	4	12	4	6 2	S. 9 E.		0	4	0	......	....
.656	.407	.614	.559	SE.	S.	E.	4	4	2	2.8	S. 35 E.		3	0	10	......	....
.840	.809	.916	.855	SE.	Calm.	Calm.	2	0	0	0.7	S. 45 E.		10	10	10	......	....
.864	.955	.907	.909	NW.	NW.	Calm.	2	2	0	1.3	N. 45 W.		10	10	10	......	....
.861	.916	.867	.881	NE.	NE.	N.	2	2	2	1.8	N. 30 E.		3	10	8	......	....
.867	.767	.871	.835	NW.	N.	N.	2	2	2	1.8	N. 15 W.		10	8	0	......	....
.807	.494	.632	.644	Calm.	N.	NW.	0	4	2	1.8	N. 15 W.		0	0	0	......	....
.756	.581	.628	.655	N.	N.	N.	12	4	2	6.0	North.		2	0	0	......	....
.794	.548	.788	.707	N.	E.	Calm.	2	2	0	1.0	N. 45 E.		0	0	0	......	....
.628	.307	.570	.502	Calm.	N.	W.	0	2	2	1.0	N. 45 W.		0	2	0	......	....
.684	.258	.669	.537	Calm.	SE.	NW.	0	2	2	0.0	....		0	8	0	......	....
.726	.598	.802	.709	NW.	N.	NW.	4	4	2	3.1	N. 27 W.		8	2	0	......	....
.712	.358	.582	.551	N.	Calm.	NW.	2	0	2	1.2	N. 23 W.		2	0	0	......	....
.681	.368	.417	.489	Calm.	E.	S.	0	2	12	4.0	S. 10 E.		0	0	0	......	....
.733	.551	.673	.652	....	....	....	....	....	...	2 7	N. 44 W.		3.9	4.1	3.3	......	....
.421	.613	.768	.601	W.	NW.	Calm.	4	4	0	2.4	N. 67 W.		0	10	6	......	....
.794	.628	.717	.714	NE.	E.	NW.	4	4	2	2.3	N. 52 E.		10	10	8	......	.02
.858	.824	.898	.860	SE.	E.	E.	2	4	2	2.5	S. 79 E.		10	10	10	......	....
.856	.787	.681	.745	E.	E.	N.	2	2	2	1.5	N. 63 E.		10	8	10	......	.36
.807	.677	.582	.689	N.	N.	NW.	4	12	4	6.2	N. 9 W.		10	0	0	......	....
.645	.379	.628	.551	N.	N.	Calm.	4	4	0	2.7	North.		0	0	0	......	....
.765	.352	.358	.492	Calm	E.	S.	0	2	4	1.5	S. 27 E.		0	3	0	......	....
.388	.156	.330	.291	Calm	S.	Calm.	0	12	0	4.0	South.		0	4	8	......	....
.732	.329	.580	.547	Calm	NE.	Calm.	0	2	0	0.7	N. 45 E.		6	10	10	......	....
.833	.746	.880	.823	Calm	NW.	Calm.	0	2	0	0.7	N. 45 W.		10	8	10	......	.30
.756	.606	.716	.693	Calm	E.	S.	0	2	2	1.0	S. 45 E.		10	7	0	......	....
.710	.592	.713	.672	N.	SE	W.	2	2	2	0.3	N. 45 W.		0	8	0	......	....
.824	.544	.822	.730	W.	N	N.	2	4	2	2.1	N. 19 W.		10	1	0	......	....
.789	.544	.723	.685	N.	N.	Calm.	4	4	0	2.7	North.		8	10	8	......	...
.507	.743	.847	.699	S.	S	W.	12	2	2	4.7	S. 8 W.		10	10	10	......	.20
.912	.628	.910	.817	W.	NW.	NW.	4	12	12	9.0	N. 51 W.		10	10	5	......	....
.829	......	587	.708	NW.	Calm.	W.	12	0	2	4.5	N. 51 W.		10	..	10	......	.30
.738	.470	.676	.628	W.	NE.	W.	2	2	2	1.0	N. 62 W.		0	0	10	......	....
.512	.334	.375	.407	SW.	SW.	SW.	12	12	25	16.3	S. 45 W.		10	3	0	......	....
.472	.289	.427	.396	SW.	SW.	SW.	35	25	12	24.0	S. 45 W.		0	2	0	......	....
.650	.216	.461	.442	S.	S.	S.	2	25	12	13.0	South.		0	0	0	......	....
.554	.639	.582	.592	S.	S	S.	12	25	12	16.3	South.		0	2	0	......	....
.765	.410	.780	.652	SE	SE.	S.	2	25	12	9.5	S. 42 E.		2	6	1	......	....
.834	......	.822	.828	S.	....	N.	2	....	2	0.0	....		10	0	5	......	....
.826	.790	.921	.846	E.	N.	Calm.	2	2	0	1.0	N. 45 E.		10	6	5	......	.02
.925	.507	.790	.741	Calm	N.	Calm.	0	2	0	0.7	North		0	10	....	......	....
.861	.680	.706	.749	Calm	NE.	W.	0	2	2	0.5	N. 22 W.		0	0	8	......	....
.822	.568	.635	.675	Calm	Calm.	Calm.	0	0	0	0.0	Calm		0	0	0	......	....
.809	.507	.708	.675	Calm	NW.	Calm.	0	2	0	0.7	N. 45 W.		0	4	0	......	....
.767	.503	.828	.699	Calm	N.	NW.	0	4	4	2.4	N. 23 W.		5	6	10	......	.01
.845	.624	.781	.750	N.	N.	Calm.	2	4	0	2.0	North		10	7	10	......	....
.735	.542	.685	.654	....	....	....	....	....	....	1.7	S. 37 W.		5.2	5.2	4.3	......	1.21

K.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	28.619	28.898	28.997	28.838	45	46	46	46.5	47	49	47.5	50	43	.280	.297	.271	.283
2	29.127	29.250	29.288	29.222	47	45.5	42	47.5	51	45.5	48	58	44.5	.316	.233	.221	.257
3	29.298	29.268	29.234	29.267	47	54	47.5	49	60	52	53.7	62.5	38	.297	.338	.270	.302
4	29.143	29.171	29.248	29.187	47.5	49.5	44	51	52.5	45.5	53	55	44.5	.283	.315	.268	.289
5	29.295	29.411	29.464	29.390	41	49	40	43	53.5	42	46.2	57	35.5	.231	.288	.221	.247
6	29.645	29.701	29.676	29.674	42	52	41.5	45	59	47	50.3	60.5	36	.228	.296	.190	.238
7	29.734	29.728	29.652	29.705	45	52	43	48	59	46	51	64	36	.260	.296	.238	.265
8	29.666	29.620	29.511	29.592	41	53	44.5	43	61	47.5	50.5	65.5	35	.231	.297	.254	.261
9	29.440	29.347	29.254	29.347	45	62.5	51	48.5	74.5	57	60	78	38.5	.253	.406	.295	.318
10	29.204	29.192	29.184	29.193	52	62	55	56	74	62	64	78	47	.349	.396	.340	.362
11	29.262	29.316	29.338	29.305	50.5	52	45	54	57	48	53	58.5	48	.322	.322	.260	.301
12	29.415	29.363	29.400	29.393	48	56	48	49	63	52	64.7	67.5	38.5	.322	.356	.282	.320
13	29.450	29.355	29.317	29.374	56.5	73	61	63	91	68	74	95	46	.371	.569	.443	.461
14	29.311	29.197	29.102	29.203	68	70	67.5	79.5	94.5	78.5	84.2	95	46	.530	.403	.526	.486
15	29.423	29.500	29.476	29.466	55	56.5	48	60	65	53	59.3	71	52.5	.367	.345	.269	.327
16	29.400	29.188	29.045	29.211	54	66.5	64	57.5	80	70	69.2	81	49	.371	.469	.516	.452
17	29.460	29.154	29.096	29.237	56	60	52.5	69	78	65	70.7	81	64.5	.276	.278	.230	.261
18	28.942	23.944	29.023	28.970	55	57	50	64.5	70	56	63.5	73	55	.307	.293	.262	.294
19	29.010	29.073	29.093	29.059	50	53	45.5	53.5	57	48	52.8	64.5	47.5	.315	.350	.272	.312
20	29.100	29.117	29.128	29.115	45	52.5	48	46.5	56	50	50.8	62.5	43.5	.280	.349	.309	.346
21	29.054	....	29.181	29.118	50	....	44.5	52	...	46	49	58	44	.334	....	.274	.309
22	29.231	29.262	29.358	29.290	48.5	52	48	50	54	51.5	51.8	55	44	.321	.362	.289	.324
23	29.433	29.458	29.433	29.441	48.5	59	48	51.5	65	50.5	55.7	68	42	.303	.420	.302	.342
24	29.381	29.311	29.251	29.314	53	62	60	57	78.5	67.5	67.7	81	48	.350	.389	.418	.386
25	29.329	29.277	29.333	29.313	55	66	53	60	85	58	67.7	86	55	.367	.385	.336	.363
26	29.347	29.299	29.285	29.310	57.5	68	60	62.5	80	70	70.8	81	54	.408	.524	.385	.439
27	29.265	29.223	29.200	29.229	60	69.5	68	68	84	75.5	75.8	89	64	.411	.526	.584	.507
28	29.172	29.194	29.165	29.177	69	56	55	75	58	55.5	62.8	87	54	.628	.422	.426	.525
29	29.162	29.117	29.117	29.132	53	55	54	54	56	55	55	59.5	51.5	.389	.420	.404	.404
30	29.090	29.172	29.206	29.156	56.5	64	57	57.5	70	61	62.8	72	53	.444	.516	.412	.457
Means....	29.280	29.280	29.268	29.276	51.4	56.3	51.0	55.4	66.6	55.7	59.2	....	....	.348	.377	.326	.351

of the north and northwestern lakes, at Marquette, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.883	.923	.781	.862	NW.....	NW...	NW...	4	12	4	6.7	N. 45 W.	10	10	10	......	1.00
.962	.622	.726	.770	NW.....	NW...	NW...	4	4	2	3.3	N. 45 W.	10	7	0	......	.20
.853	.653	.693	.733	N......	Calm..	Calm..	2	0	0	0.7	North ...	0	7	7	......	....
.756	.796	.881	.811	Calm	Calm..	Calm..	0	0	0	0	Calm....	10	10	10	......	.10
.833	.702	.829	.788	NW.	N. ...	NW. ..	2	4	2	2.4	N. 23 W..	6	5	0	Evaporation for the month, 4.125.	....
.762	.592	.590	.648	N.	N.	N. ...	2	4	4	3.3	North ...	0	1	0		....
.777	.592	.767	.712	N..	N. ...	N.	4	4	2	3 3	North ...	0	0	0		....
.833	.553	.775	.720	Calm ...	NE....	W.	0	2	2	0.5	N. 22 W.	0	0	0		...
.743	.476	.634	.618	Calm	E.	W.....	0	2	2	0.0	....	0	0	0		....
.805	.472	.612	.630	Calm ...	Calm..	W	0	0	2	0.7	West....	8	8	2		....
.770	.692	.777	.720	N.........	N.	W.. ..	2	4	2	2.1	N. 19 W.	10	10	0		....
.926	.619	.727	.757	N.........	E.	Calm..	12	2	0	4.0	N. 10 E..	5	0	0		....
.644	.391	.647	.561	S..	S.	S.. ...	2	4	4	3.3	South....	3	0	0		....
.527	.249	.540	.439	S.	SW. ..	Calm..	12	25	0	11.3	S. 31 W.	0	1	0		....
.708	.558	.667	.644	N.........	N.	Calm..	2	4	0	2.0	North ...	0	0	10		....
.784	.458	.704	.649	S.	S.. ...	Calm..	4	25	0	9.7	South....	0	10	4		....
.391	.290	.373	.351	W.........	N.	N......	12	25	2	10.0	N. 24 W.	0	0	0		....
.507	.400	.627	.511	W.........	W.....	W.. ..	12	4	4	6.7	West	10	10	10		....
.767	.752	.813	.777	W.	N.	NE....	2	2	4	1.6	N. 10 E..	10	10	10		...
.883	.778	.856	.839	N.... ...	N.....	N.....	2	4	2	2.7	North ...	10	8	10		.....
.861	......	.882	.872	Calm....	....	N.	0	....	4	2.0	North ...	10	....	10		....
.892	.867	.758	.842	NW.	N.....	NW. ..	2	4	2	2.4	N. 23 W.	10	10	8	......	.20
.792	.680	.822	.795	NW.	E.	N.	4	4	2	1.7	N. 14 E..	5	0	0	......	....
.752	.456	.621	.610	SW.	S..	S......	12	12	2	8.0	S. 21 E..	0	8	0	......	....
.708	.320	.698	.575	S.........	S......	N.	4	12	2	4.7	South ...	0	6	4	......	....
.721	.512	.525	.586	N.	E.	S..	2	12	4	4.0	S. 80 E..	0	1	0	......	....
.601	.452	.662	.572	SW.	S......	S......	12	4	4	6.2	S. 27 W.	0	5	1	......	....
.724	.876	.967	.856	SW......	NW...	N.	4	2	2	1.4	N. 82 W.	5	10	10	......	.90
.933	.935	.934	.934	NW.	NW. ..	NW...	4	4	4	4.0	N. 45 W.	10	10	10	......	.20
.936	.704	.769	.803	NW.....	NE....	Calm..	4	4	0	1.9	North ...	3	3	7	......	....
.768	.799	.722	.696	....	....	....	....	....	....	1.1	N. 77 W.	4.5	5.2	4.1	......	2.60

LAKE MICHIGAN.

METEOROLOGICAL OBSERVATIONS.

Approximate height of lake above the level of the sea, 576 feet.

Location of stations and names of observers.

Milwaukie, Wisconsin.—Lat. 43° 02′ 34″ N.; Long., 87° 54′ 22″ W.; height above the lake, 15 feet. Observer, I. A. Lapham.

Grand Haven, Michigan.—Lat. 43° 03′ 50″ N.; Long., 86° 14′ W.; height above the lake, 12 feet. Observer, Heber Squier.

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.483	29.492	29.467	29.480	66	68	62	71	80	70	73.7	81	63	.572	.524	.449	.515
2	29.478	29.370	29.610	29.486	64	66	60	68	76	71	71.7	81	56	.543	.505	.371	.473
3	29.097	29.054	29.135	29.095	67	73	68	73	81	72	75.3	82	68	.581	.703	.631	.638
4	29.210	29.222	29.225	29.219	68.5	71	66	72	75	68	71.7	83.5	65	.646	.704	.612	.654
5	29.405	29.433	29.458	29.432	....	65	63	63	70	66	66.3	72	61	....	.550	.536	.543
6	29.543	29.473	29.373	29.463	63	65	65	65	72	68	68.3	75	71	.519	.524	.577	.550
7	29.340	29.291	29.247	29.293	74	80	74	79	90	82	83.7	93	61	.772	.897	.731	.800
8	29.260	29.569	29.104	29.311	76	79	75	81	90	91	87.3	93	75	.829	.841	.651	.773
9	29.180	29.253	29.278	29.237	64	65	62	66	70	65	67.	83	63	.569	.550	.516	.545
*10	29.313	29.283	29.200	29.265	56	70	68	66	76	73	71.7	83	57	.316	.652	.618	.528
11	29.153	29.229	29.392	29.258	69	71	64	72	85	69	75.3	87	57	.668	.570	.529	.589
12	29.548	29.578	29.583	29.569	60	62	61	65	71	64	66.7	73	59	.451	.436	.497	.461
13	29.571	29.505	29.368	29.481	58	65	65	63	75	68	68.7	77	54	.416	.519	.577	.504
14	29.248	29.458	29.448	29.381	63	66	58	65	70	60	65.	72	60	.549	.586	.456	.530
15	29.583	29.593	29.598	29.591	53	56	55	56	67	59	60.7	68	51	.363	.290	.380	.344
16	29.702	29.680	29.639	29.673	55	61	59	59	70	64	64.3	76	50	.380	.482	.433	.431
17	29.661	29.495	29.478	29.544	57	66	66	62	78	72	70.7	79	59	.399	.478	.559	.478
18	29.535	29.493	29.451	29.493	62	63	58	65	71	60	65.3	72	59	.516	.469	.436	.480
†19	29.426	29.378	29.393	29.399	57	64	63	60	76	70	68.7	77	59	.426	.436	.482	.448
20	29.418	29.387	29.390	29.398	64	70	66	68	82	69	73.	84	62	.513	.572	.599	.571
21	29.388	29.358	29.153	29.299	63	67	67	65	73	70	69.3	76	60	.549	.581	.622	.584
22	29.153	29.248	29.325	29.242	66	65	62	69	74	66	69.7	76	65	.599	.497	.502	.532
†23	29.431	29.568	29.598	29.532	62	59	53	66	66	57	63.	69	56	.502	.407	.350	.419
24	29.596	29.536	29.476	29.536	60	65	63	63	73	67	67.7	73	51	.478	.510	.522	.503
25	29.421	29.327	29.325	29.357	64	72	68	69	86	73	76.	85	....	.529	.596	.618	.581
26	29.285	29.207	....	29.246	69	73.5	68	73	89	73	78.3	90	68	.655	.616	.618	.629
27	29.260	29.262	29.230	29.250	64	66	62	68	75	66	69.7	79	64	.543	.519	.502	.521
28	29.353	29.334	29.352	29.346	61	67	66	66	84	73	74.3	85	61	.470	.568	.545	.527
29	29.483	29.553	29.515	29.527	61	63	57	66	70	61	65.7	74	60	.470	.482	.412	.454
30	29.581	29.523	29.440	29.514	63	66	64	66	73	67	68.7	71	57	.536	.545	.556	.545
‡31	29.303	29.097	29.052	29.150	66	70	67	68	78	71	72.3	79	63	.612	.625	.608	.615
Means....	29.394	29.395	29.378	29.389	63.2	67.2	63.7	66.8	76.3	68.6	70.6	....	....	.533	.556	.532	.540
Sept. 1	29.090	29.183	29.363	29.212	60	54	48	63	61	53	59.	72	52	.478	.325	.269	.357
2	29.489	29.452	29.421	29.454	44	52	51	47	60	54	53.7	62	42	.249	.282	.335	.288
3	29.379	29.273	29.278	29.310	52	69	70	57	80	75	70.7	81	51	.322	.561	.666	.516
4	29.330	29.342	29.355	29.342	67	7	69	72	63	73	69.3	87	68	.595	....	.655	.625
5	29.350	29.275	29.315	29.313	69	73	59	72	76	60	69.3	86	62	.668	.771	.487	.642
6	29.359	29.389	29.213	29.320	51	61	60	57	62	62	60.3	64	55	.295	.523	.491	.436
7	29.293	29.203	29.200	29.232	60	68	68.5	62	76	73	70.3	78	59	.491	.577	.636	.568
8	29.369	29.476	29.556	29.467	55	57	56	58	72	59	63.	74	54	.393	.266	.409	.356
9	29.636	29.576	29.531	29.561	54	62	58	57	69	60	62.	74	51	.378	.462	.456	.432
10	29.524	29.428	29.369	29.440	57	66.5	63	58	72	67	65.7	72	50	.452	.577	.522	.517
11	29.288	29.198	29.305	29.263	67	71	55	70	77	59	68.7	79	57	.622	.678	.380	.560
12	29.591	29.697	29.717	29.668	45	47	47	50	54	53	52.3	61	46	.231	.231	.244	.236
13	29.705	29.611	29.558	29.624	50	55	51	55	62	53	56.7	62	51	.295	.340	.384	.339
14	29.551	29.481	29.498	29.510	56	64	63	58	69	65	64.	70	49	.422	.529	.549	.500
15	29.578	29.611	29.628	29.604	57	56	54	59	60	58	59.	65	56	.439	.396	.305	.400
16	29.541	29.428	29.321	29.430	58	61	62	60	64	64	62.7	64	56	.456	.497	.529	.494
17	29.256	29.132	29.075	29.154	64	64	63	65	66	64	65.	68	62	.583	.569	.562	.571
18	29.268	29.398	29.501	29.389	49	56	53	52	63	56	57.	68	59	.308	.356	.363	.342
19	29.612	29.578	29.548	29.579	50	58	54	52	64	56	57.3	65	47	.334	.403	.391	.376
20	29.489	29.455	29.488	29.477	55	68	63	58	76	65	66.3	76	53	.393	.577	.549	.506
21	29.513	29.405	29.400	29.439	59	65	62	61	78	68	69.	78	53	.473	.443	.476	.464
22	29.429	29.385	29.403	29.405	60	57.5	61	64	67	65	65.3	78	60	.465	.347	.483	.431
23	29.335	29.303	29.480	29.372	63	63	52	66	68	54	62.7	79	51	.536	.509	.362	.469
24	29.619	29.578	29.521	29.572	43	52	48	46	62	51	53.	62	42	.238	.256	.296	.263
25	29.491	29.371	29.396	29.420	46	54	50	49	65	53	55.7	65	45	.271	.272	.321	.288
26	29.419	29.378	29.368	29.388	48	59	55	50	70	57	59.	70	45	.309	.354	.407	.356
§27	29.336	29.248	29.231	29.272	51.5	63	61	53	69	64	62.	74	48	.361	.495	.497	.451
28	29.253	29.218	29.338	29.279	50.5	55	58	61	71.5	58	63.5	74	56	.489	.214	.482	.395
29	29.436	29.410	29.416	29.420	53	55	54	57	59	56	57.3	60	54	.350	.380	.391	.373
30	29.418	29.363	29.330	29.370	53	60	61	54	61	62	59.	62	53	.389	.505	.523	.472
Means....	29.439	29.393	29.401	29.409	55.2	60.2	57.6	58.1	67.2	60.5	61.9	....	....	.409	.438	.449	.434

* Tornado at Dubuque, Iowa.

† Aurora at 9 p. m.

‡ Attached

of the north and northwestern lakes, at Milwaukie, Wisconsin.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.754	.512	.613	.626	W	E.SE	N	2	2	2	0.4	N. 9° W.	8	5	8	.390	....
.793	.563	.490	.615	Calm	SE	SE	0	4	2	2.0	S. 45 E.	0	1	10	.265	....
.716	.665	.804	.728	S	W	W.SW	2	2	2	1.6	S. 35 W.	8	5	0	.195	.2[illegible]
.829	.812	.895	.845	W	E	SW	2	2	2	0.7	S. 45 W.	1	10	10	.155	.90
......	.751	.838	.794	NN.W	S. SE	Calm	2	2	0	0.0	....	0	1	0	....	.15
.890	.666	.843	.797	S. SE	SE	Calm	2	2	0	1.3	S. 35 E.	1	10	9	.248	....
.779	.630	.669	.692	SW	SW	SW	2	4	4	3.3	S. 45 W.	1	0	0	....	....
.784	.597	.448	.609	W. SW	SW	SW	2	4	4	3.2	S. 49 W.	0	0	9	....	....
.891	.751	.836	.829	NE	NE	Calm	2	2	0	1.3	N. 45 E.	10	5	0	.108	.05
.495	.727	.761	.657	SE	SE	SE	2	2	2§	2.0	S. 45 E.	0	1	5	....	....
.858	.474	.747	.691	Calm	W.NW	NW	0	25	4	9.5	N. 64 W.	5	1	0	.065	.16
.731	.576	.833	.713	N	E	Calm	2	2	0	1.0	N. 45 E.	0	0	0	.250	....
.723	.599	.843	.721	Calm	SE	SW	0	2	2	0.9	South	1	10	10	.210	....
.890	.799	.880	.856	N	NE	Calm	2	12	0	4.5	N. 39 E.	10	8	0	.050	.57
.809	.424	.761	.664	N	E	Calm	2	2	0	1.0	N. 45 E.	0	0	0	.035	....
.761	.658	.727	.715	Calm	SW	SW	0	4	2	2.0	S. 45 W.	0	1	0	.190	....
.718	.499	.712	.643	SW	SW	Calm	2	12	0	4.7	S. 45 W.	10	5	9	.200	....
.836	.618	.880	.778	NE	NE	Calm	12	12	0	8.0	N. 45 E.	0	0	0	.210	....
.822	.486	.658	.655	Calm	SE	Calm	0	4	0	1.3	S. 45 E.	0	2	1	.230	.04
.793	.524	.846	.721	W	SE	Calm	2	4	0	1.0	S. 16 E.	1	3	0	.230	....
.890	.716	.484	.696	Calm	SE	SW	0	2	2	0.9	South	10	10	0	.170	....
.846	.593	.786	.741	W.NW.	W.NW	Calm	4	12	0	5.3	N. 68 W.	10	1	0	.155	....
.786	.636	.752	.724	N.NW	N.NE	N.NE	4	35	2	13.2	N. 18 E.	0	0	0	.160	....
.831	.629	.790	.750	E	SE	S	2	4	2	2.3	S. 45 E.	10	5	1	.200	....
.747	.480	.761	.662	S	SW	Calm	2	4	0	1.9	S. 30 W.	5	4	0	.175	....
.807	.451	.761	.673	SW	S.SW	Calm	2	4	0	1.9	S. 30 W.	0	3	0	.245	....
.793	.599	.786	.726	W	N	Calm	2	2	0	1.0	N. 45 W.	1	5	0	.270	....
.735	.677	.672	.694	NW	W	W	2	12	2	5.2	N. 85 W.	0	1	1	.215	....
.735	.658	.769	.720	N. NE	NE	N	2	12	2	5.2	N. 37 E.	8	0	5	.300	....
.838	.672	.811	.783	NE	SE	Calm	2	4	0	1.5	S. 71 E.	9	1	2	.210	....
.895	.653	.802	.783	SW	SW	W	2	12	2	5.3	S. 52 W.	10	9	0	.170	.87
.792	.615	.751	.719	......	......	......	....	....	....	0.4	N. 50 W.	3.8	3.4	2.5	5.321	2.94
.831	.606	.667	.701	NW	NE	N	4	35	2	12.2	N. 36 E.	0	8	1	.105	....
.772	.546	.802	.706	N	SE	Calm	2	2	0	0.5	N. 67 E.	0	0	0	.145	....
.692	.548	.768	.669	S	S.SW.	S.SW.	4	12	4	6.5	S. 19 W.	0	0	0	.160	....
.758	......	.807	.782	SW	SW	Calm	4	4	0	2.7	S. 45 W.	0	10	9	.236	.35
.852	.860	.940	.884	SW	SW	N	2	2	4	1.0	N. 67 W.	9	10	10	......	.55
.834	.942	.884	.886	N	NE	N	2	2	2	1.8	N. 15 E.	10	5	3	......	.41
.884	.644	.784	.804	Calm	SW	W	0	4	4	2.4	S. 67 W.	5	1	0	......	....
.816	.340	.819	.658	W	N	Calm	2	4	0	1.5	N. 27 W.	2	0	0	.185	....
.812	.653	.880	.781	Calm	SE	Calm	0	4	0	1.3	S. 45 E.	2	1	2	.160	....
.937	.735	.790	.820	Calm	SE	Calm	0	4	0	1.3	S. 45 E.	10	9	10	.155	....
.848	.731	.761	.780	S	SW	W	2	4	12	5.2	S. 72 W.	0	1	10	.100	.59
.646	.552	.606	.601	N	N.NE.	N.NE.	4	35	4	14.3	N. 20 E.	10	8	0	.140	....
.681	.612	.864	.719	SE	SE	Calm	2	4	0	2.0	S. 45 E.	5	2	0	.215	....
.876	.747	.890	.837	Calm	SE	Calm	0	12	0	4.0	S. 45 E.	10	10	1	.125	....
.878	.765	.756	.799	N. NE	N.NE.	NE	25	25	12	20.3	N. 27 E.	10	10	5	.125	....
.880	.833	.888	.867	SE	SE	Calm	2	2	0	1.3	S. 45 E.	10	10	10	.110	....
.944	.891	.943	.926	NW	S	SW	2	2	2	1.1	S. 51 N.	0	10	0	.325	1.35
.794	.619	.809	.740	W	NW	Calm	2	2	0	1.2	N. 67 W.	0	0	0		.42
.861	.675	.872	.802	Calm	SE	Calm	0	4	0	1.3	S. 45 E.	0	0	0	.055	....
.816	.644	.890	.783	W	SW	Calm	4	2	0	1.8	S. 15 W.	0	0	0	.150	....
.882	.463	.695	.646	Calm	S	SW	0	2	4	1.9	S. 30 W.	2	8	0	.180	....
.780	.524	.783	.695	SW	S	Calm	4	2	0	1.9	S. 30 W.	2	10	0	.170	....
.838	.743	.867	.816	SW	N	N	2	12	4	4.9	N. 6 W.	0	0	0	.125	.64
.767	.461	.790	.672	N.NW	W	Calm	2	2	0	1.1	N. 57 W.	0	0	0	.030	....
.781	.441	.798	.610	SE	SE	Calm	2	12	0	4.7	S. 45 E.	0	0	0	.110	....
.856	.482	.874	.737	Calm	S	Calm	0	12	0	4.0	South	0	0	0	.210	....
.898	.700	.833	.810	Calm	SE	S	0	4	2	1.9	S. 30 E.	0	0	10	.195	....
.911	.278	1.000	.729	Calm	S. SE	N	0	2	12	3.0	N. 5 E.	1	8	10	.125	.74
.752	.761	.872	.798	NE	NE	NE	12	12	2	8.7	N. 45 E.	10	5	10	.050	....
.933	.941	.942	.938	N	Calm	Calm	2	0	0	0.7	North	10	10	10	.165	.37
.827	.646	.829	.767	......	......	......	....	....	....	1.2	N. 36 E.	3.6	4.5	3.3	......	5.40

thermometer, 67°; barometer at 6 p. m., 29.140.

§ "Heat lightning" at the NW. at 7 p. m.

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
October 1	29.383	29.328	29.283	29.331	58.5	63	63.5	59	64	61	62.3	65	57	.484	.562	.579	.541
2	29.323	29.376	29.388	29.302	63.5	64	62	65	68	61	65.7	67	57	.566	.543	.529	.546
3	29.343	....	29.070	29.207	61	72	72	61.5	78.5	75	71.7	79	59	.530	.697	.744	.657
4	29.268	29.478	29.666	29.471	50	51	47	55	62	51	56	76	50	.295	.202	.270	.255
5	29.777	29.651	29.516	29.648	45	54	54	47	60	58	55	62	42	.273	.338	.365	.325
6	29.128	29.061	29.070	29.086	55	68	69	60	73	72	68.3	75	56	.367	.618	.688	.557
7	29.069	28.977	28.930	28.989	68	73	71	70	81	76	75.7	81	67	.658	.703	.691	.684
8	28.955	29.105	29.275	29.111	68	56	55	72	60	57	63	76	56	.631	.396	.407	.544
9	29.508	29.523	29.568	29.533	46	53	51	49	58	54	53.7	61	45	.271	.336	.335	.314
10	29.526	29.559	29.626	29.570	47	45	40	51	48	43	47.3	50	41	.270	.260	.208	.246
11	29.686	29.629	29.566	29.627	37	43	39	38	49	41	42.7	49	35	.207	.199	.212	.206
12	29.475	29.353	29.316	29.381	37	48	44	38.5	57	45.5	47	57	36	.201	.217	.268	.228
13	29.312	29.283	29.426	29.340	40	53	47	42	63.5	51	52.2	63	38	.221	.264	.270	.251
14	29.587	29.591	29.648	29.608	37	42	40	40	47	45	44	59	39	.181	.202	.182	.188
15	29.642	29.497	29.338	29.492	38	47	42	39.5	50	45	44.8	52	37	.210	.283	.228	.240
16	29.118	29.117	29.374	29.203	44	48	41	46	58	44	49.3	60	42	.262	.203	.218	.227
17	29.555	29.556	29.523	29.544	34	45	43	36	50	44.5	43.5	53	42	.170	.234	.258	.220
18	29.444	29.268	29.328	29.346	47	60	52	49.5	70	63	60.8	70	43	.290	.385	.243	.306
19	29.509	29.616	29.647	29.590	36	41	37	43	51	39	44.3	63	39	.121	.126	.194	.147
20	29.457	29.120	28.945	29.174	38	52	46	40	56	55	50.3	63	35	.203	.335	.192	.243
21	28.981	28.971	29.139	29.030	41	48	37	49	60	46	51.7	61	45	.223	.177	.103	.167
22	29.369	29.419	29.583	29.457	32	37	32	37	46	35	39.3	47	35	.116	.103	.142	.120
23	29.699	29.501	29.341	29.513	32	43	49	36	49	46	43.7	54	....	.129	.199	.169	.165
24	29.294	29.514	29.734	29.514	41	35	29	47	39	32	39.7	50	30	.179	.152	.126	.152
25	29.945	29.937	29.904	29.928	23	32	27	26	36	28	30	38	25	.089	.129	.136	.118
26	29.673	29.491	29.411	29.525	21	36	28	27	39	32	32.7	41	23	.095	.173	.108	.125
27	29.352	29.264	29.198	29.271	26	38	40	29	43	45	42.3	47	26	.106	.164	.182	.150
28	29.143	29.194	29.371	29.236	37	42	38	40	50	42	44	50	....	.181	.162	.177	.173
29	29.512	29.480	29.414	29.469	33	46	46	34	51	51	46.3	56	32	.175	.245	.206	.208
30	29.287	29.224	29.241	29.250	45	55	48	53	68	52	57.7	69	50	.194	.261	.282	.245
31	29.179	29.140	29.243	29.187	47	56	49	55	71	53	59.7	71	49	.217	.250	.295	.254
Means...	29.402	29.374	29.389	29.387	43.0	50.3	46.2	46.4	56.7	50.1	51.1	....	....	262	.294	.291	.284
Nov. 1	29.286	29.268	29.394	29.316	44	38	37	45.5	45	39	43.2	53	38	.268	.138	.194	.200
2	29.330	29.275	29.298	29.301	....	36	33	35	38	36	36.3	40	34	.....	.186	.149	.167
3	29.394	29.521	29.506	29.473	29	36	36	32	41	40	37.7	42	30	.026	.147	.160	.111
4	29.382	29.254	29.276	29.304	34	47	42	36	55	48	46.3	55	31	.170	.217	.189	.192
5	29.454	29.560	29.682	29.565	36	34.5	28	38	42	32	37.3	48	31	.186	.102	.108	.132
6	29.474	29.133	29.224	29.277	25	32	31	26	35	32	31	39	24	.123	.142	.162	.142
7	29.500	29.586	29.594	29.560	33	33	28	37	39	31	35.7	39	28	.136	.110	.119	.121
8	29.595	29.541	29.558	29.564	25	36	30	27	41	33	33.7	42	25	.112	.147	.132	.130
9	29.625	29.631	29.661	29.639	31	40	33	34	46	35	38.3	49	31	.139	.167	.162	.156
10	29.592	29.421	29.263	29.425	29	43	43	30	46	50	42	51	28	.149	.238	.186	.191
11	29.101	29.065	29.341	29.169	45	43	31	49	45	34	42.7	51	33	.247	.251	.139	.212
12	29.542	29.484	29.535	29.520	22	32	30	25	35	32	30.7	46	23	.084	.142	.144	.123
13	29.600	29.523	29.486	29.539	24	34	34	26	38	38	34	43	23	.106	.144	.144	.131
14	29.778	29.827	29.949	29.851	27	25	22	29	29	25	27.7	40	22	.124	.089	.084	.099
15	30.034	29.955	29.922	29.970	27	35.5	35	29	36.5	38	34.5	39	27	.124	.195	.165	.161
16	29.803	29.715	29.672	29.730	36	38	38	38	40	49	39.3	43	36	.186	.203	.203	.197
17	29.774	29.752	29.772	29.766	38	41	37	42	44	38	41.3	49	37	.203	.218	.207	.209
18	29.611	29.536	29.411	29.519	36	44	42	37	45	43	41.7	45	35	.199	.275	.254	.242
19	29.374	29.336	29.271	29.327	37	36	31	39	39	33	37	43	32	.194	.173	.151	.172
20	29.222	29.317	29.408	29.315	28	32	26	30	37	29	32	36	23	.136	.116	.106	.119
21	29.354	29.222	29.246	29.274	23	37	34	25	42	37	34.7	42	24	.100	.155	.157	.137
22	29.408	29.522	29.652	29.527	31	34	27	34	39	31	34.7	41	30	.139	.131	.101	.123
23	29.724	29.614	29.463	29.600	20	29	28	21.5	35	32	29.5	35	20	.091	.091	.108	.096
24	29.227	29.125	29.194	29.182	31	37	35	32	42	39	37.7	43	30	.162	.155	.152	.156
25	29.277	29.325	29.426	29.312	31	30	28	34	32	30	32	41	29	.139	.144	.130	.138
26	29.453	29.346	29.238	29.345	24	32	28	27	31	30	30.3	37	25	.095	.155	.130	.126
27	28.969	28.933	29.001	28.967	29	30	29	30	32	31	31	34	27	.149	.144	.137	.143
28	28.946	26.910	28.985	28.947	24	26	22	26	29	25	26.7	32	23	.106	.106	.084	.098
*29	29.072	29.113	29.156	29.113	24	32	28	27	35	30	30.7	35	21	.095	.142	.130	.122
30	29.134	29.199	29.231	29.188	29	30	26	30	33	30	31	35	26	.149	.132	.095	.125
Means...	29.434	29.400	29.427	29.420	30.1	35.1	31.7	32.4	38.9	34.4	35.2	....	....	.142	.158	.146	.149

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* River is slightly covered with ice.

of the north and northwestern lakes, at Milwaukie, Wisconsin.

VAPOR. Humidity. Saturation = 1.000. 7 a. m.	VAPOR. Humidity. 2 p. m.	VAPOR. Humidity. 9 p. m.	VAPOR. Humidity. Mean.	WIND. Direction—from whence. 7 a. m.	WIND. Direction—from whence. 2 p. m.	WIND. Direction—from whence. 9 p. m.	WIND. Velocity, in miles per hour. 7 a. m.	WIND. Velocity, in miles per hour. 2 p. m.	WIND. Velocity, in miles per hour. 9 p. m.	WIND. Resultant velocity, in miles per hour.	WIND. Resultant direction. °	Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.) 7 a. m.	Amount of cloudiness. 2 p. m.	Amount of cloudiness. 9 p. m.	Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
.969	.943	.971	.961	Calm	SE	E	0	2	2	1.2	S. 67 E	10	10	10	.100	1.40
.916	.793	.888	.865	N. NE	E	SE	2	2	2	1.4	N. 84 E	10	10	10	.110	....
.970	.715	.858	.847	SE	S	S	2	25	25	17.0	S. 2 E	10	2	2	.060	....
.681	.364	.722	.589	W	W	Calm	25	35	0	20.0	West	0	0	0	.130	....
.847	.653	.756	.732	Calm	S. SE	S	0	25	4	9.5	S. 19 E	0	0	9	.200	....
.708	.761	.852	.740	SW	SW	W	12	12	4	9.0	S. 51 W	10	10	10	.170	1.04
.898	.665	.771	.778	SW	SW	SW	12	25	25	20.7	S. 45 W	10	5	0	.145	.13
.804	.765	.874	.814	SW	W	W	12	12	2	8.0	S. 69 W	8	10	8		.46
.781	.698	.802	.760	Calm	Calm	Calm	0	0	0	0.0	Calm	5	10	10	.125	....
.722	.777	.750	.749	NW	N	N	2	4	2	2.5	N. 11 W	8	5	0	.045	....
.905	.572	.824	.767	N	E	Calm	2	2	0	1.0	N. 45 E	0	0	0	.065	....
.860	.465	.881	.735	Calm	S	Calm	0	4	0	1.3	South	0	0	0	.065	....
.829	.451	.722	.667	Calm	SW	N. NE	0	2	25	7.7	N. 21 E	1	0	3	.060	....
.732	.624	.607	.654	N	NE	NE	4	4	4	3.7	N. 30 E	10	1	8	.105	....
.863	.786	.762	.803	N	E. NE	Calm	2	2	0	1.1	N. 33 E	10	7	10	.090	.13
.843	.421	.756	.673	W	NW	N.NW	2	12	2	5.0	N. 47 W	0	2	0	.010	....
.802	.646	.878	.775	N	SE	Calm	2	4	0	1.0	S. 74 E	0	0	0	.120	....
.819	.525	.422	.588	SW	SW	NW	12	25	25	14.8	S. 79 W	3	0	0	.070	....
.433	.337	.816	.528	NW	N	Calm	4	12	0	5.0	N. 10 W	0	0	0	.135	....
.820	.747	.445	.670	SW	SW	SW	2	25	35	20.7	S. 45 W	5	8	10	.075	....
.638	.342	.330	.437	W	W	NW	2	45	4	16.7	N. 87 W	0	5	0	.140	....
.527	.330	.698	.518	W. NW	NW	Calm	4	12	0	5.0	N. 50 W	10	0	0	.125	....
.610	.572	.543	.575	Calm	S	S. SW	0	4	4	2.6	S. 11 W	10	10	10	.115	.04
.554	.636	.694	.628	W	W	NW	2	12	12	11.2	N. 75 W	10	9	10	.015	.06
.634	.610	.883	.709	N	NE	Calm	4	12	0	5.0	N. 34 E	10	5	0	.105	....
.644	.726	.594	.654	Calm	SW	Calm	0	4	0	1.3	S. 45 W	10	0	0		....
.665	.587	.697	.619	Calm	SE	S	0	4	4	2.4	S. 23 E	0	10	10	.070	....
.732	.450	.661	.614	S	W	NW	2	12	2	4.3	S. 87 W	5	0	0		....
.895	.653	.493	.680	Calm	SE	SW	0	2	12	4.0	S. 36 W	0	9	0	.070	....
.483	.381	.727	.530	W	W	Calm	4	12	0	5.3	West	2	9	2	.065	....
.502	.330	.733	.521	SW	W	Calm	25	25	0	15.5	S. 68 W	0	0	0	.145	....
.744	.591	.720	.684	....	....	....	....	....	....	4.3	S. 68 W	5.2	4.2	4.0	2.730	3.26
.881	.459	.816	.718	E	NE	NW	2	4	2	1.8	N. 38 E	10	10	9	.150	....
......	.811	.705	.758	N. NW	NW	W	2	4	4	3.0	N. 59 W	10	10	8	.025	.14
.694	.567	.645	.635	NW	NE	SE	2	4	2	1.3	N. 45 E	0	1	0	.010	....
.802	.502	.563	.622	S. SE	S	SW	2	4	4	2.9	S. 13 W	2	10	0	.090	....
.811	.381	.594	.595	N	N	N.NW	4	12	2	6.0	N. 3 W	10	0	0	.000	.04
.876	.698	.896	.823	SW	SW	N	2	4	2	1.6	S. 62 W	0	10	10	......	.04
.619	.463	.685	.589	E	NE	N	2	12	2	5.0	N. 45 E	9	0	0	......	....
.761	.567	.703	.677	Calm	Calm	Calm	0	0	0	0.0	Calm	0	5	0	......	....
.712	.543	.797	.684	W. NW	E	Calm	2	2	0	0.2	N. 14 E	0	0	0	......	....
.890	.767	.515	.724	Calm	SE	SW	0	4	12	4.2	S. 27 W	0	3	10	......	.28
.710	.840	.712	.754	SW	W	West	12	2	2	5.0	S. 56 W	10	10	8	......	....
.622	.698	.794	.704	W	W	SW	2	2	2	1.8	S. 75 W	0	8	0	......	....
.754	.628	.628	.670	W. NW	S	Calm	2	2	0	0.7	S. 56 W	1	10	1	......	....
.775	.556	.622	.651	NW	N	N	2	2	2	1.8	S. 15 W	10	0	10	......	.05
.775	.901	.719	.798	E	SE	SE	2	2	2	1.9	S. 60 E	10	10	10	......	....
.811	.820	.820	.817	SE	NE	Calm	2	2	0	0.9	East	8	10	10	......	.50
.820	.756	.905	.827	Calm	Calm	Calm	0	0	0	0.0	Calm	10	10	10	......	....
.903	.920	.916	.913	Calm	Calm	Calm	0	0	0	0.0	Calm	10	10	10	......	....
.816	.726	.800	.780	N	N	N	4	4	2	3.3	North	10	10	0	......	....
.834	.527	.665	.675	N	N	N.NW	4	12	2	6.0	N. 3 W	10	10	0	......	....
.746	.577	.712	.678	Calm	W	Calm	0	4	0	1.3	West	10	0	0	......	....
.712	.547	.582	.613	N	N	N	4	4	2	3.3	North	3	9	0	......	....
.787	.448	.594	.609	NW	W	SW	2	4	2	2.3	West	0	0	0	......	....
.896	.577	.636	.703	SW	W	W	4	12	2	5.7	S. 81 W	3	0	10	......	....
.712	.794	.782	.762	N	N	N	2	4	4	3.3	North	10	10	10	......	....
.644	.792	.782	.739	W	W	SW	4	4	4	3.7	S. 76 W	10	2	0	......	....
.890	.794	.788	.824	S. SW	N	NW	2	2	4	1.5	N. 50 W	10	10	10	......	.07
.754	.665	.622	.680	W	W	Calm	2	2	0	1.3	West	10	10	8	......	....
.644	.698	.782	.708	NW	NW	Calm	2	2	0	1.3	N. 45 W	10	5	0	......	....
.890	.703	.569	.720	N	N	N	2	2	2	2.0	North	10	10	9	......	.16
.777	.657	.711	.715	....	....	....	....	....	....	1.0	N. 46 W	6.5	6.4	4.7	......	1.28

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals. 7 a. m.	2 p. m.	9 p. m.	Mean.	TEMPERATURE—FAHRENHEIT. Wet bulb, or point of evaporation. 7 a. m.	2 p. m.	9 p. m.	Dry bulb, or temperature of the open air. 7 a. m.	2 p. m.	9 p. m.	Mean.	Maximum.	Minimum.	VAPOR. Elasticity, U. S. inches and decimals. 7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.574	29.662	....	29.618	25	25	23	23	28	25	27.	30	22	.100	.100	.100	.100
2	29.729	29.594	29.447	29.590	16.5	21	18	18.5	24	20	20.8	31	11	.063	.079	.076	.072
3	29.315	29.394	29.423	29.377	23	21	21	25	24	22	23.7	29	19	.100	.079	.101	.093
4	29.378	29.262	29.344	29.328	18	22	19	20	26	21	22.3	28	17	.076	.072	.080	.076
5	29.320	29.174	29.282	29.258	17	23	16	18	26	20	21.3	30	12	.083	.089	.044	.072
6	29.536	29.607	29.657	29.600	3	7	4	4	10	6	6.7	22	2	.038	.026	.030	.031
7	29.664	29.626	29.519	29.606	0	13	6	1	16	8	8.3	19	0	.032	.034	.034	.033
8	29.303	29.381	29.542	29.408	15	25	19	17	29	21	22.3	30	13	.063	.089	.080	.077
9	29.645	29.549	29.502	29.565	16	30	26	17	33	28	26.	34	14	.078	.132	.117	.109
10	29.388	29.287	29.256	29.310	31	38	38	33	46	44	41.	46	25	.151	.125	.151	.142
11	29.237	29.218	29.381	29.278	38	43	39	42	48	41	43.7	50	40	.177	.212	.212	.200
12	29.394	29.228	29.196	29.272	39	38	40	40	40	43	41.	44	35	.225	.203	.238	.222
13	29.111	29.092	29.236	29.146	46	49	40	48	55	42	48.3	55	39	.284	.269	.221	.258
14	29.260	29.063	29.080	29.134	37	42	39	39	43	42	41.3	50	37	.194	.254	.199	.215
15	29.163	29.111	29.095	29.123	30	30	30	33	33	33	33.	42	32	.132	.132	.132	.132
16	29.123	29.297	29.496	29.305	26	27	21	28	31	24	27.7	34	23	.117	.101	.179	.099
17	29.812	29.895	29.882	29.863	15	22	22	17	25	25	22.3	27	15	.063	.084	.084	.077
18	29.605	29.362	29.509	29.492	24	36	35	27	42	38	35.7	42	24	.095	.134	.165	.131
19	29.800	29.937	30.020	29.919	26	23	21	29	25	23	25.7	40	21	.106	.100	.090	.098
20	30.032	29.970	29.805	29.935	21	24	23	24	28	26	26.	29	20	.079	.083	.089	.083
21	29.571	29.471	29.513	29.518	28	....	28	29	28	29	28.7	39	24	.142	....	.142	.142
22	29.439	29.371	29.499	29.436	35	38	32	36	40	35	37.	42	27	.191	.203	.142	.178
23	29.596	29.532	29.396	29.508	32	33	36	36	36	37	36.3	40	32	.129	.149	.199	.159
24	29.209	29.249	29.318	29.258	43	43.5	40	43.5	50.5	45	46.3	51	36	.271	.191	.182	.214
25	29.347	29.229	29.161	29.245	34	38	35	36	41	37	38.	46	35	.170	.190	.178	.179
26	28.911	28.953	29.166	29.010	41	40	34	41	43	36	40.	43	35	.257	.208	.170	.211
27	29.217	29.203	29.213	29.211	29	29	27	30.5	31	29	30.2	36	28	.154	.137	.124	.138
28	29.181	28.996	29.100	29.092	30	40	36	31	44	39	38.	44	26	.155	.195	.173	.174
29	29.349	29.506	29.436	29.430	32	32.5	30	35	36.5	33	34.8	40	32	.142	.178	.132	.150
30	29.462	29.457	29.574	29.497	25	26	21	28	29	23	26.7	35	22	.100	.106	.090	.098
31	29.609	29.604	29.594	29.602	20	35	28	21	36.5	31	29.5	41	20	.096	.184	.119	.133
Means....	29.428	29.396	29.422	29.416	26.6	30.1	27.3	28.2	33.8	29.9	30.6	....	....	.131	.138	.127	.131
1863.																	
Jan. 1	29.508	29.361	29.248	29.372	26	35	35	29	41	37	35.7	41	19	.106	.126	.178	.137
2	29.152	28.945	29.031	29.042	36	39	45	38	41	47	42.	47	26	.186	.212	.273	.223
3	29.053	29.013	28.897	28.988	45	43	45	46	44	46	45.3	47	39	.286	.264	.286	.279
4	28.808	28.978	28.955	28.913	36	34	36	39	40	39	39.3	50	31	.173	.118	.173	.154
5	28.998	28.985	29.072	29.018	33	34	29	36	37	31	34.7	....	....	.149	.157	.137	.148
6	29.197	29.334	29.471	29.334	10	9.5	8	11	11	9	10.3	32	7	.057	.049	.051	.052
7	29.626	29.632	29.618	29.625	3	14	15	5	17	17	13.	29	5	.027	.048	.063	.046
8	29.578	29.559	29.626	29.588	19	24	16	21	26	17	21.3	29	14	.080	.106	.078	.088
9	29.505	29.452	29.229	29.425	13.5	32	34	14	35	36	28.3	36	11	.073	.142	.170	.128
10	28.973	28.988	29.073	29.011	32	27	21	35	29	24	29.3	36	23	.142	.124	.079	.115
11	29.155	29.289	29.409	29.284	17	22	21	19	25	22	22.	27	16	.071	.084	.101	.085
12	29.362	29.416	29.571	29.449	23	34	32	24	37	34	31.7	39	21	.112	.157	.155	.141
*13	29.354	29.048	29.022	29.108	34	40	42	35.5	40.5	45	40.3	51	33	.176	.241	.228	.215
14	29.220	29.161	29.271	29.217	25	22	17	27	25	19	23.7	46	19	.112	.084	.071	.089
15	29.245	29.143	29.189	29.192	15	18	16	16	20	18	18.	23	13	.074	.076	.067	.072
16	29.256	29.324	29.479	29.316	8.5	11.5	9	10	14	10	11.3	14	7	.046	.044	.034	.048
17	29.640	29.678	29.725	29.681	10	20	17	11	24	18.5	17.8	26	7	.057	.062	.077	.065
18	29.704	29.657	29.692	29.684	16	32	29	17	37	31.5	28.5	....	....	.078	.116	.131	.108
19	29.706	29.656	29.619	29.694	26	33	32	28	36	34	32.7	37	27	.117	.149	.155	.140
20	29.407	29.374	29.414	29.398	34.5	36	35	36	37	36	36.3	41	33	.180	.199	.191	.190
21	29.518	29.569	29.563	29.550	32	32.5	33	33	34.5	34	33.8	37	32	.168	.158	.175	.167
22	29.421	29.394	29.421	29.412	34.5	36	36	36	38	37	37.	41	33	.180	.186	.199	.188
23	29.422	29.281	29.162	29.291	34	47	37	35	48.5	38	40.5	39	33	.183	.303	.207	.231
24	29.237	29.362	29.515	29.371	33	33	31	35	36	33	34.7	41	32	.162	.149	.151	.154
25	29.595	29.552	29.558	29.568	28	38	34	29	41	36	35.3	43	28	.142	.190	.170	.167
26	29.484	29.424	29.436	29.448	33	31	26	35	36	29	33.3	38	27	.162	.116	.106	.128
27	29.472	29.467	29.612	29.517	21	25	24	23	29	28	28.7	30	21	.090	.089	.083	.087
28	29.484	29.354	29.251	29.363	17	30	26	19	32	29	26.7	34	17	.071	.144	.106	.107
29	29.039	28.928	29.016	28.994	26	33	29	28	40	31	33.	40	36	.117	.097	.137	.117
30	29.288	29.396	29.314	29.333	26.5	27	26	29	31	29	29.7	32	26	.115	.101	.106	.107
31	29.305	29.264	29.231	29.266	24	31	30	26	33	32	30.3	34	24	.106	.151	.144	.133
Means....	29.348	29.322	29.345	29.338	24.8	29.8	27.9	26.3	33.4	29.9	29.8	....	....	.122	.137	.139	.132

* Foggy.

of the north and northwestern lakes, at Milwaukie, Wisconsin.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.655	.653	.746	.685	N. NW	N. NW	NW	4	4	2	3.2	N. 27 W.	10	10	10	......	....
.622	.610	.702	.644	W	SW	SW	2	4	2	2.5	S. 56 W.	10	2	0	......	....
.746	.610	.860	.739	W	NW	W	4	4	2	3.1	N. 72 W.	10	10	10	......	....
.702	.515	.712	.643	SW	NW	NW	2	2	2	1.5	N. 71 W.	10	10	0	......	....
.840	.634	.412	.628	SW	W	N	2	4	12	3.9	N. 27 W.	10	10	5	......	....
.740	.377	.520	.545	N	N. NW	NW	12	12	4	9.0	N. 16 W.	0	0	0	......	....
.707	.553	.553	.604	NW	W	SW	2	2	2	1.6	West	0	10	10	......	....
.671	.536	.712	.646	W. SW	NW	Calm	2	2	0	1.1	N. 79 W.	0	0	0	......	....
.834	.703	.768	.768	Calm	W	Calm	0	2	0	0.7	West	2	0	0	......	....
.800	.400	.522	.574	W	SW	SW	12	4	12	8.7	S. 64 W.	0	0	0	......	....
.661	.631	.824	.705	SW	W	W	4	12	2	5.7	S. 81 W.	0	10	10	......	....
.910	.820	.750	.826	E	SE	S	2	2	2	1.7	S. 45 E.	10	10	10	......	....
.850	.620	.829	.766	SW	W	W	4	25	2	10.0	S. 85 W.	10	1	10	......	.39
.816	.916	.744	.825	SW	SE	W	2	2	12	4.1	S. 77 W.	10	10	10	......	....
.703	.703	.703	.703	W	W	W	2	2	2	2.0	West	0	0	0	......	.09
.768	.582	.610	.653	W	NW	NW	12	4	12	8.7	S. 64 W.	5	10	10	......	....
.671	.622	.622	.638	NW	NW	S	4	2	4	1.4	N. 87 W.	0	0	10	......	....
.644	.500	.719	.621	S. SW	SW	W	12	35	2	15.7	S. 42 W.	0	1	0	......	....
.665	.746	.730	.713	NE	NE	N	45	12	4	20.3	N. 42 E.	10	10	10	......	....
.610	.543	.634	.595	SE	S	SW	2	4	2	2.3	South	10	5	10	......	....
.887	......	.887	.887	SW	W	Calm	4	4	0	2.4	S. 67 W.	0	10	0	......	.04
.900	.820	.698	.806	W	W	N	4	12	2	5.4	N. 83 W.	10	10	10	......	....
.610	.705	.903	.739	E	SE	SE	2	4	4	3.2	S. 54 E.	10	10	10	......	....
.958	.520	.607	.695	SW	W	W	4	12	12	9.0	S. 84 W.	5	2	0	......	.31
.802	.738	.807	.782	W	Calm	Calm	2	0	0	0.7	West	0	10	10	......	....
1.000	.750	.802	.850	E	N	Calm	2	25	0	8.3	N. 5 E.	10	10	0	......	.54
.945	.788	.775	.836	W	W	W	2	4	4	3.3	West	0	5	8	......	....
.893	.677	.726	.765	SW	SW	W	2	2	4	2.4	S. 67 W.	5	3	2	......	....
.698	.946	.703	.782	N	N	N	2	2	2	2.0	North	10	10	10	......	....
.635	.665	.730	.683	N	N	NW	12	12	2	8.3	N. 3 W.	10	10	0	......	....
.855	.853	.685	.797	W. SW	SW	SW	2	4	4	3.2	S. 49 W.	10	0	0	......	....
.768	.658	.709	.714	....	....	....	....	....	....	2.4	N. 71 W.	6.2	6.3	5.5	......	1.37
.665	.488	.807	.653	SW	S	S	4	4	25	10.7	S. 5 W.	10	9	10	......	....
.811	.824	.847	.827	S	S	SW	4	25	12	12.8	S. 13 W.	10	10	10	......	.26
.921	.918	.921	.920	S	SE	NW	2	2	2	0.7	South	10	10	10	......	.70
.726	.476	.736	.646	N. NW	W	SW	4	12	2	5.0	N. 81 W.	10	10	10	......	....
.705	.712	.788	.735	SW	Calm	W	2	0	2	1.2	S. 67 W.	10	10	10	......	.13
.797	.696	.784	.739	W	NW	W. NW	25	12	2	12.3	N. 75 W.	0	5	0	......	....
.500	.509	.671	.560	W. NW	W	SW	2	2	2	1.7	S. 83 W.	0	10	10	......	....
.712	.754	.834	.767	Calm	NW	Calm	0	2	0	0.7	N. 45 W.	10	5	0	......	....
.908	.698	.802	.802	Calm	S	S	0	2	4	2.0	South	0	10	10	......	....
.698	.775	.610	.694	W	W	W	2	12	2	5.3	West	1	10	10	......	....
.692	.622	.860	.725	NW	N	Calm	2	2	0	1.2	N. 23 W.	10	0	0	......	....
.868	.712	.792	.790	Calm	NW	E	0	2	2	0.5	N. 23 E.	2	0	0	......	....
.849	.955	.762	.855	SE	SE	W	4	2	12	3.0	S. 62 W.	10	10	10	......	.77
.761	.622	.699	.692	W	W	NW	4	4	2	3.1	N. 81 W.	5	9	0	......	....
.829	.702	.682	.737	N	N	N	2	2	25	9.7	North	10	10	10	......	.02
.687	.545	.791	.674	N	N	W. NW	4	2	2	2.3	N. 15 W.	10	2	0	......	....
.797	.483	.765	.682	SW	S	S	2	4	2	2.5	S. 11 W.	0	3	0	......	....
.834	.527	.740	.700	S	S	SW	4	2	2	2.5	S. 11 W.	0	5	0	......	....
.768	.705	.792	.755	Calm	E	E	0	2	2	1.3	East	10	10	10	......	....
.851	.903	.900	.884	SE	SE	Calm	4	2	0	2.0	S. 45 E.	10	10	10	......	.66
.893	.794	.895	.862	N	NW	SW	2	2	2	1.1	N. 54 W.	10	10	10	......	....
.851	.811	.903	.855	SW	SW	Calm	2	2	0	1.3	S. 45 W.	10	10	10	......	....
.898	.888	.905	.897	E	SE	S	2	4	12	5.2	S. 18 E.	10	10	10	......	.73
.797	.705	.800	.767	SW	W	W	12	4	2	5.6	S. 60 W.	10	10	10	......	....
.887	.738	.802	.809	Calm	SW	Calm	0	2	0	0.7	S. 45 W.	0	0	10	......	....
.797	.550	.665	.670	N	N	NW	2	2	2	1.8	N. 15 W.	10	5	0	......	....
.730	.556	.581	.622	N	N	N	2	2	2	2.0	North	10	10	5	......	....
.692	.794	.665	.717	Calm	W	SW	0	2	2	1.2	S. 67 W.	0	0	0	......	....
.768	.393	.788	.619	W. SW	W	W	2	2	2	1.9	S. 82 W.	0	5	10	......	.66
.720	.582	.665	.656	NW	W	W	4	2	2	1.9	N. 60 W.	10	0	10	......	....
.754	.800	.794	.782	SW	NW	SE	2	2	2	0.7	S. 45 W.	0	0	0	......	....
.779	.685	.775	.746	....	....	....	....	....	...	1.6	S. 65 W.	6.3	6.7	5.9	......	3.93

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	28.911	28.988	29.371	29.090	32	17	6	35	19	8	20.7	36	6	.142	.071	.034	.082
2	29.627	29.659	29.697	29.661	—5	1	—5	—4	2.5	—2	—1.7	8	—6	.023	.028	....	.025
3	29.805	29.832	29.892	29.843	—11	0	0	—10	3	2	1.7	5	—12	.014	.010	.021	.015
4	29.857	29.753	29.657	29.756	10	19	20	11.5	21	23	18.5	23	1	.051	.080	.074	.068
*5	29.490	29.520	29.496	29.502	19	22	19	20	24	21	21.7	28	18	.092	.095	.080	.089
6	29.488	29.352	29.332	29.390	16	24	22	17	27	25	23.	33	5	.078	.095	.084	.086
7	29.386	29.480	29.326	29.397	21	32	27	23	35	30	29.3	38	21	.090	.142	.113	.115
8	29.738	29.697	29.531	29.655	23	28	28	25	30	32	29.	33	19	.100	.130	.108	.113
9	29.405	29.083	29.474	29.321	31	37	25	32	39	27	32.	39	26	.162	.194	.112	.156
10	29.695	29.733	29.697	29.700	17	23	23	19	26	25	23.3	27	17	.071	.089	.100	.086
11	29.529	....	29.461	29.495	24	....	23	26	....	25.5	25.8	34	23	.106	....	.095	.100
12	29.443	29.612	29.616	29.557	24	22.5	19	25	27	21	23.7	31	19	.117	.091	.080	.096
13	29.668	29.710	29.472	29.617	23	29	33	24	31	34	29.7	34	12	.112	.137	.175	.141
14	29.174	28.811	29.118	29.034	33	42	28	36	44	31	37.	44	17	.149	.241	.119	.169
15	29.506	29.597	29.752	29.618	16	25	22	18	30	26	24.7	34	16	.067	.078	.072	.072
16	29.861	29.750	29.642	29.751	11	27.5	32	13	31	33	25.7	33	11	.049	.110	.168	.109
17	29.505	29.426	29.389	29.440	32	37	33	32	41	35	36.	43	31	.181	.168	.162	.170
18	29.290	29.177	29.169	29.178	33	38	34	35	40	35	36.7	40	31	.162	.203	.183	.182
†19	29.086	28.943	29.088	29.039	34	36	29	35	37	32	34.3	38	30	.183	.199	.126	.169
20	29.418	29.549	29.657	29.541	24	27	27	26	31	30	29.	31	24	.106	.101	.113	.106
21	29.838	29.812	29.689	29.779	22	21	21	23	24	24	23.7	33	21	.107	.079	.079	.088
‡22	29.545	29.605	29.688	29.613	21	23	20	23	26	23	24.	27	19	.090	.089	.074	.088
23	29.702	29.606	29.525	29.611	17	29	27	18	32	28	26.	34	11	.083	.126	.136	.115
24	29.515	29.514	29.517	29.515	25	33	34	27	36	36	33.	40	25	.112	.119	.170	.144
25	29.491	29.439	29.238	29.389	32	35	34	33.5	37	36	35.5	41	30	.162	.178	.170	.170
26	28.879	28.922	29.143	28.981	40	36	34	41	39	37	39.	45	35	.235	.173	.157	.188
27	29.355	29.481	29.568	29.468	28	35	32	31	38	34	34.3	40	30.5	.119	.165	.155	.146
28	29.520	29.386	29.245	29.384	32	37	34	34	41	36	37.	47	33	.115	.168	.170	.164
Means....	29.490	29.460	29.480	29.476	22.3	25.7	24.3	23.5	28.9	27.7	26.7	....	....	.111	.125	.115	.116
Mar. 1	29.151	29.205	29.241	29.199	34	35.5	34	35	39	36	36.7	42	33	.183	.162	.170	.172
2	29.096	29.098	29.309	29.168	33	32	27.5	34	33	30	32.3	36	27	.175	.168	.121	.155
3	29.525	29.554	29.516	29.532	9	23	20	11	27	21.5	19.8	29	14	.043	.078	.091	.071
4	29.782	29.800	29.740	29.774	11	21	16	12	25	17	18.	27	11	.061	.079	.073	.073
5	29.484	29.184	28.972	29.180	24	32	35	26	34	37	32.3	37	15	.106	.155	.178	.146
6	29.260	29.434	29.466	29.387	36	24	21	39	28.5	25	30.8	38	24	.173	.077	.067	.106
7	29.393	29.309	29.216	29.306	20	28	32	22	32	33	29.	33	20	.085	.108	.168	.120
8	29.078	29.068	29.198	29.115	32	32	18	33	36	21	30.	37	20	.168	.129	.067	.121
9	29.365	29.464	29.477	29.435	16	21	20	18	25	22	21.7	29	12	.067	.079	.085	.077
10	29.325	29.173	29.218	29.239	28	34	31	30	41.5	35	35.5	43	17	.130	.098	.128	.119
11	29.395	29.429	29.548	29.457	27	26	17	29	30	21	26.7	36	20	.124	.095	.049	.089
12	29.635	29.694	29.691	29.673	14	19	16	16	22	19	19.	36	15	.059	.059	.056	.058
13	29.651	29.616	29.520	29.596	16	24	24	18	28	27	24.3	31	16	.067	.083	.095	.082
14	29.318	29.161	29.116	29.198	26	33	33	28	37	36	33.7	40	26	.117	.136	.149	.134
15	29.072	29.198	29.391	29.220	32	34	31	34.5	39	34	35.8	39	26	.149	.189	.139	.159
16	29.519	29.601	29.376	29.499	27	36.5	35	30	41	38	36.3	43	28	.113	.157	.165	.145
17	29.291	29.359	29.490	29.382	38	37	30	41	39	34	38.	48	32	.190	.194	.121	.168
18	29.691	29.711	29.719	29.707	27	32	32	27.5	33	33	31.2	35	26	.141	.168	.168	.159
19	29.705	29.649	29.624	29.659	29	32	33	32	37	37	35.5	37	31	.126	.116	.136	.126
20	29.481	29.467	29.413	29.450	32	32	32	32	34	33	33.	38	31	.181	.155	.168	.168
21	29.370	29.394	29.453	29.406	35	37	36	36	40	37	37.7	41	32	.191	.181	.199	.190
22	29.387	29.261	29.236	29.295	35	38	38	36	39	39	38.	41	35	.191	.216	.216	.208
23	29.187	29.281	29.196	29.221	38.5	39	38	39	40	39	39.3	41	37	.227	.225	.216	.223
24	29.068	29.072	29.119	29.080	35	39	32	37	47	35	39.7	47	34	.178	.134	.142	.151
25	29.156	29.177	29.280	29.211	28	28.5	27	31	33	30	31.3	36	29	.119	.105	.113	.112
26	29.378	29.374	29.437	29.396	21	29	29	24.5	35	31	30.2	38	22	.073	.091	.137	.100
27	29.435	29.329	29.231	29.332	30	36	34	31	40	36	35.8	41	....	.155	.160	.170	.162
28	29.237	29.337	29.482	29.352	27	27	21	31	32	25	29.3	37	24	.137	.090	.067	.098
29	29.634	29.676	29.721	29.677	19	27	26	22	31	28	27.	32	19	.069	.101	.117	.096
30	29.681	29.467	29.274	29.474	27	38	35	28.5	45	39	37.5	45	24	.130	.138	.152	.140
31	29.340	29.462	29.496	29.433	27	25.5	24	30	30	27	29.	....	24	.113	.086	.095	.098
Means....	29.389	29.386	29.391	29.389	26.9	30.1	28.3	28.8	34.6	30.8	31.4	....	....	.130	.129	.129	.129

* Snow 3 inches. † Snow 1 inch. ‡ Aurora this evening.

of the north and northwestern lakes, at Milwaukie, Wisconsin.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.698	.692	.553	.648	SW	W	W	2	60	25	28.5	S. 89 W.	10	10	10	......	....
.645	.586	......	.615	N.NW	NW	NW	12	4	2	5.9	N. 30 W.	10	10	10	......	....
.539	.193	.438	.390	W.NW	N.NW.	W.NW	2	2	2	1.8	N. 52 W.	10	10	10	......	....
.701	.712	.598	.670	SW	S	S	2	4	2	2.5	S. 11 W.	10	10	10	......	....
.850	.738	.712	.767	Calm	N	N.NW.	0	2	2	1.3	N. 12 W.	10	10	10	......	.20
.834	.644	.622	.700	Calm	SW	S.SW.	0	2	2	1.3	S. 30 W.	0	0	10	......	....
.730	.698	.675	.701	SW	W	NW	2	2	2	1.6	West	10	5	0	......	....
.746	.782	.594	.707	N.NE	NE	E	2	12	2	5.1	S. 48 W.	10	10	10	......	....
.896	.816	.761	.824	SE	W	W	4	4	4	1.9	S. 61 W.	10	10	10	......	.56
.692	.634	.746	.691	W	W.NW	Calm	2	2	0	1.3	N. 78 W.	8	0	10	......	....
.754	......	.698	.726	Calm	Calm	NE	0	0	2	0.7	N. 43 E.	8	10	10	......	....
.872	.684	.712	.756	N	NE	Calm	4	12	0	5.0	N. 34 W.	10	10	10	......	....
.868	.788	.895	.850	Calm	SE	SE	0	2	2	1.3	S. 45 E.	10	10	0	......	....
.705	.836	.685	.742	S	SW	W	4	12	45	18.3	S. 77 W.	10	9	1	......	.58
.682	.465	.515	.554	W	W	W.NW	4	2	2	2.6	S. 84 W.	0	0	0	......	....
.623	.635	.893	.717	W	SE	SE	2	2	2	1.0	S. 74 E.	0	8	10	......	....
1.000	.653	.797	.817	Calm	SE	Calm	0	2	0	0.7	S. 45 E.	0	0	0	......	....
.797	.820	.898	.838	Calm	SW	S	0	2	2	1.2	S. 23 W.	10	10	10	......	....
.898	.903	.694	.832	Calm	E.NE	N	0	2	12	4.3	N. 8 E.	10	10	10	......	.15
.754	.582	.675	.670	N	N	NE	2	2	2	1.9	N. 15 E.	0	2	0	......	....
.864	.610	.610	.694	NE	E	E	4	4	12	6.3	N. 82 E.	9	10	10	......	....
.730	.634	.508	.654	NE	NE	Calm	2	25	0	9.0	N. 45 E.	10	0	0	......	....
.840	.694	.834	.789	Calm	SE	W	0	2	2	0.5	S. 23 W.	0	4	0	......	....
.761	.705	.802	.756	Calm	SE	Calm	0	2	0	0.7	S. 45 E.	10	0	8	......	....
.841	.807	.802	.816	Calm	SE	E	0	2	2	1.2	S. 67 E.	10	10	10	......	....
.912	.726	.712	.783	S	W	W	2	25	2	9.0	S. 86 W.	10	10	10	......	.36
.685	.719	.792	.732	W.NW	SE	Calm	2	2	0	0.2	S. 34 W.	0	1	0	......	....
.792	.653	.802	.749	Calm	S	Calm	0	2	0	0.7	South	10	10	10	......	....
.775	.682	.708	.721	....	....	....	....	....	....	1.7	N. 73 W.	7.3	7.1	6.7	......	1.85
.898	.681	.802	.794	S	NW	SE	2	2	2	0.7	South	10	9	5	......	....
.895	.893	.729	.839	E	NE	NE	2	60	60	40.3	N. 46 E.	10	10	0	......	.70
.596	.529	.787	.637	N	N	Calm	2	2	0	1.3	North	0	8	1	......	....
.804	.610	.834	.749	N	NE	Calm	2	2	0	1.2	N. 23 E.	0	0	0	......	....
.754	.792	.807	.784	W	W	W	2	12	12	8.7	West	10	10	10	......	.03
.726	.496	.500	.574	W	NW	Calm	4	12	0	1.8	N. 75 W.	0	0	0	......	....
.721	.594	.893	.736	N	E	SE	2	2	2	1.2	N. 80 E.	2	9	10	......	....
.893	.610	.570	.691	W	W	W	2	4	4	3.3	West	10	8	0	......	.04
.682	.610	.721	.671	W	Calm	Calm	2	4	0	2.0	West	0	0	0	......	....
.782	.374	.628	.595	SW	W	W	2	4	2	2.5	S. 79 W.	5	0	0	......	....
.775	.569	.431	.592	W.NW.	NW	NW	2	2	4	2.6	N. 50 W.	10	10	0	......	.03
.659	.659	.541	.620	W.NW.	NW	W	2	4	2	2.5	N. 61 W.	1	0	0	......	....
.682	.543	.644	.623	NW	N	W	2	2	2	1.6	N. 45 W.	2	0	10	......	....
.768	.619	.705	.697	Calm	E	E	0	2	2	1.3	East	0	0	0	......	....
.744	.948	.712	.801	E	NE	Calm	2	2	0	1.2	N. 67 E.	2	10	10	......	....
.675	.609	.719	.668	Calm	E	Calm	0	2	0	0.7	East	0	10	10	......	....
.738	.816	.617	.724	Calm	NE	NE	0	4	35	13.0	N. 45 E.	3	10	10	......	.02
.941	.893	.893	.909	NE	NE	NE	12	25	4	13.7	N. 45 E.	10	6	10	......	....
.694	.527	.619	.613	E	E	E	4	2	2	2.7	East	10	10	10	......	....
1.000	.792	.893	.895	E	E	SE	25	12	25	19.2	S. 72 E.	10	10	10	......	.50
.900	.732	.903	.845	Calm	Calm	S	0	0	2	0.7	South	10	10	10	......	....
.900	.907	.907	.905	E	NE	NE	2	2	2	1.8	N. 60 E.	10	10	10	......	.51
.953	.910	.907	.923	E	N	N	2	2	2	1.5	N. 27 E.	10	10	10	......	.64
.807	.413	.698	.639	NW	W	W	2	2	2	5.2	N. 85 W	10	5	9	......	....
.685	.558	.675	.639	N	N	NW	2	2	2	1.8	N. 15 W	10	10	10	......	....
.554	.418	.788	.587	NW	NW	S	2	2	2	1.0	N. 74 W	0	0	0	......	....
.893	.654	.802	.783	SW	SE	Calm	2	4	0	1.5	S. 18 E.	1	2	5	......	....
.788	.496	.500	.595	NE	NE	N	35	12	35	25.3	N. 19 E.	10	9	5	......	....
.524	.582	.768	.615	W	NE	Calm	2	12	0	0.5	N. 22 W	10	0	0	......	.01
.809	.479	.636	.641	SW	SW	SW	2	4	2	2.7	S. 45 W	0	0	0	......	....
.675	.517	.644	.612	N	N	E	35	25	2	20.0	N. 2 E.	9	5	0	......	....
.774	.640	.718	.711	....	....	....	....	....	....	3.4	N. 30 E.	5.6	5.8	5.0	......	2.48

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Means.
1863.					°	°	°	°	°	°	°	°	°				
April 1	29.305	28.971	28.768	29.015	26	41	43	29	50	49	42.7	53	22	.106	.139	.199	.148
2	28.863	29.010	29.138	29.003	39	38	45	47	50	49	48.7	56	36	.134	.072	.247	.151
3	29.452	29.684	29.722	29.619	29	29	29	30	33	30.5	31.2	39	28	.149	.114	.143	.135
4	29.746	29.644	29.556	29.649	29	39	35	30	42	37	36.3	44.5	25	.149	.199	.178	.175
5	29.429	29.319	29.433	29.394	35	46	38	38	55	41	44.7	57	32	.165	.192	.190	.182
6	29.450	29.536	29.632	29.539	33	34.5	30	38	40	35	37.7	42	34	.123	.128	.109	.120
7	29.664	29.672	29.712	29.683	27	28	28	30	32.5	32	31.5	36	26	.113	.102	.108	.108
8	29.729	29.701	29.666	29.699	31	31	29	35	38	33	35.3	39	30	.128	.093	.114	.112
9	29.630	29.497	29.314	29.490	33	40	40	35	46	44	41.7	47	26	.162	.169	.236	. 89
10	29.130	29.058	29.006	29.065	43	46	55	46	48	60	51.3	61	41	.238	.284	.367	.296
11	28.988	29.080	29.336	29.135	54	44	36	58	50	39	49.	60	38	.365	.209	.173	.249
12	29.539	29.564	29.536	29.553	29	35	30	33	38	33	34.7	39	29	.114	.165	.132	.137
13	29.555	29.527	29.499	29.527	31	39	34	34	45	38	39.	46	26	.139	.160	.144	.148
14	29.478	29.416	29.392	29.429	36	39	37	40	46	41	42.3	49	36	.160	.147	.168	.158
15	29.370	29.324	29.368	29.354	38	44	37	44	52	42	46.	54	39	.151	.183	.155	.163
16	29.382	29.384	29.396	29.387	38	46	41	42	52	44	46.	57	34	.177	.232	.218	.209
17	29.390	29.276	29.228	29.298	42	46	44	45	52	49	48.7	53	36	.228	.232	.223	.228
18	29.146	29.112	29.133	29.130	45	51	53	49	60	55	54.7	64	45	.247	.255	.376	.293
19	29.259	29.312	29.391	29.321	45	47	41	48	52	43	47.7	52	42	.260	.257	.231	.249
20	29.418	29.409	29.436	29.421	41	43	41	42	45	42	43.	49	39	.244	.251	.244	.246
21	29.371	29.402	29.459	29.411	44	46	42	45	47	43	45.	49	40	.275	.297	.254	.275
22	29.400	29.376	29.388	29.388	44	48	42	46	50	42.5	46.2	54	39	.262	.309	.260	.277
23	29.402	29.351	29.356	29.370	45	51	45	47	60	57	51.3	60	40	.273	.255	.142	.223
24	29.387	29.434	29.459	29.427	44	58.5	39.5	54	61	45	53.3	67	44	.157	.457	.171	.262
25	29.537	29.567	29.546	29.563	39	37.5	44	44	47	49	46.7	64	37	.173	.100	.223	.165
26	29.577	29.557	29.511	29.548	40	44	41	44	52	45	47.	53	33	.195	.183	.205	.194
27	29.467	29.374	29.293	29.378	40	47	42	46	56	49	50.3	57	41	.169	.204	.175	.183
28	29.223	29.196	29.216	29.212	43	43.5	44	52	51	52	51.7	57	41	.160	.184	.183	.176
29	29.272	29.302	29.344	29.306	40	45	39	44	55	49	49.3	57	40	.195	.168	.108	.157
30	29.401	29.389	29.339	29.376	41.5	45	43	50	56.5	51	52.5	60	41	.151	.148	.173	.157
Means....	29.399	29.381	29.387	29.389	38.1	42.3	39.5	42.1	48.7	43.9	44.9	....	....	.185	.196	.195	.192
May 1	29.327	29.236	29.253	29.272	46	52	51	56	63	65	61.3	69	46	.179	.243	.189	.204
2	29.306	29.319	29.304	29.310	42	40	42	44	44	45	44.3	58	40	.241	.195	.228	.221
3	29.270	29.222	29.229	29.240	40	42	41	42	44	42	42.7	48	41	.221	.241	.244	.235
4	29.175	29.171	29.224	29.190	41	42	42	42	43	43	42.7	46	39	.244	.254	.254	.251
5	29.225	29.344	29.424	29.331	39	34	36	40	34.5	40	38.2	50	32	.225	.189	.160	.191
6	29.400	29.429	29.432	29.420	39	41	40	48	48	47	47.7	41	38	.121	.166	.156	.148
7	29.452	29.407	29.394	29.418	40	45	43	45	58	49	50.7	60	35	.182	.129	.199	.170
8	29.450	29.381	29.448	29.426	48	55	54	54	73	62	63.	73	42	.256	.194	.312	.254
9	29.384	29.301	29.264	29.316	45	47	43	52	53	45	50.	64	44	.207	.244	.251	.234
10	29.177	29.214	29.286	29.226	55	61.5	44	59	63	45	55.7	70	43	.380	.526	.257	.388
11	29.391	29.369	29.431	29.297	46	48.5	47	47	50	48	48.3	54	43	.297	.321	[illegible]	.309
12	29.477	29.449	29.459	29.462	50.5	53.5	50	52	67	55	58.	68	45	.348	.231	.295	.291
13	29.392	29.367	29.392	29.484	50	50	47	54	55	49	52.7	68	45	.308	.295	.297	.300
14	29.532	29.567	29.554	29.551	45	45	43	50	53	47	50.	56	43	.234	.194	.225	.218
*15	29.480	29.214	29.006	29.233	45	55	53	48	66	60	58.	67	41	.260	.287	.310	.286
16	29.182	29.214	29.296	29.231	48	49	44	55	61	47	54.3	62	45	.243	.190	.249	.227
*17	29.357	29.449	29.524	29.443	42	47	43	48	53	46	49.	56	41	.189	.244	.238	.224
18	29.595	29.554	29.522	29.557	45	52	47.5	50	63	54	55.7	63	38	.234	.243	.243	.240
19	29.514	29.408	29.373	29.432	51	60	57	60	76	66	67.3	78	49	255	.305	.346	.302
20	29.428	29.405	29.425	29.453	57	65	58	66	82	70	72.7	84	58	.346	.390	.323	.353
21	29.518	29.515	29.511	29.515	59	61	54	69	73	60	67.3	81	60	.367	.376	.338	.357
22	29.538	29.461	29.388	29.462	58.5	61	56	64	73	61	66.	74	55	.424	.376	.383	.394
23	29.303	29.286	29.316	29.302	55	62	61	57	70	63	63.3	72	55	.407	.449	.510	.455
24	29.243	29.183	29.226	29.217	55	60	57	61	70	61	64.	72	55	.354	.385	.412	.384
25	29.293	29.284	29.311	29.296	54	53	51	56	56	54	55.3	62	50	.391	.363	.335	.363
26	29.339	29.374	29.371	29.361	50	....	....	51	49.5	55	51.8	60	48	.348	....	....	.348
27	29.439	29.434	29.386	29.420	51	56	50	54	64	56	58.	66	50	.335	.343	.282	.320
28	29.446	29.229	29.346	29.340	54	55	52	58	59	61	59.3	64	53	.365	.380	.269	.338
29	29.266	29.206	29.082	29.185	52	54	58	57	58	60	58.3	69	53	.322	.375	.456	.384
30	28.955	28.928	28.912	28.932	58.5	63.5	59	59	66	60	61.7	66	57	.484	.552	.487	.508
31	28.895	28.875	28.918	28.896	48	52	55	49	53	57	53.	60	47	.322	.375	.407	.368
Means....	29.346	29.312	29.331	29.329	48.6	52.0	49.2	53.1	59.3	54.0	55.5	....	....	.392	.301	.298	.300

* Sprinkle.

of the north and northwestern lakes, at Milwaukie, Wisconsin.

VAPOR.				WIND.										Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.							
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.				
											°					
.655	.386	.572	.538	S	W	SW	12	35	12	16.0	S. 65 W.	9	0	0	......	....
.413	.199	.710	.441	N	N	N	12	35	4	17.0	North	7	3	5	......	....
.890	.606	.839	.778	NE	NE	Calm	25	45	0	23.3	N. 45 E.	10	0	0	......	....
.890	.744	.807	.814	Calm	SE	....	0	12	....	6.0	S. 45 E.	0	0	0	.225	....
.719	.445	.738	.634	Calm	S	NE	0	2	25	7.8	N. 49 E.	8	10	10	.080	....
.537	.517	.537	.530	NE	NE	NE	35	45	45	41.7	N. 45 E.	9	0	0	.100	....
.657	.552	.594	.601	NE	NE	NE	25	35	12	24.0	N. 45 E.	0	0	0	.100	....
.628	.408	.606	.547	SE	SE	Calm	2	2	0	1.3	S. 45 E.	1	0	0	.100	....
.797	.543	.704	.681	SE	S	SE	2	12	4	5.5	S. 15 E.	0	8	10	.155	....
.767	.850	.708	.775	Calm	Calm	S.SW	0	0	25	8.3	S. 23 W.	10	10	10	......	.23
.756	.581	.726	.688	W	W	NE	25	35	35	14.3	N. 55 W.	10	10	10	.030	....
.606	.719	.703	.676	N	NE	Calm	12	35	0	14.7	N. 34 E.	10	0	0	.115	....
.712	.533	.628	.624	Calm	SE	Calm	0	4	0	1.3	S. 45 E.	0	0	0	.110	....
.645	.471	.653	.623	SE	NE	NE	4	25	25	16.7	N. 50 E.	10	10	0	......	....
.522	.472	.577	.524	NE	NE	Calm	12	2	0	4.7	N. 45 E.	10	0	0	.266	....
.661	.598	.756	.672	Calm	SE	Calm	0	2	0	0.7	S. 45 E.	0	0	0	.080	....
.762	.508	.638	.636	Calm	SE	Calm	0	12	0	4.0	S. 45 E.	0	0	0	.120	....
.710	.493	.869	.691	SE	SE	Calm	12	25	0	12.3	S. 45 E.	0	2	10	.140	.23
.777	.660	.833	.757	Calm	SE	Calm	0	4	0	1.3	S. 45 E.	10	2	0	.060	....
.914	.840	.914	.889	NE	NE	NE	4	4	12	6.7	N. 45 E.	10	8	0	.235	.43
.920	.923	.916	.920	NE	SE	Calm	4	12	0	4.2	S. 63 E.	10	10	10	.020	.07
.843	.856	.957	.885	Calm	NE	NE	0	12	25	12.3	N. 45 E.	10	10	10	.180	.08
.847	.493	.305	.548	NE	NE	Calm	25	45	0	23.3	N. 45 E.	10	0	0	.055	....
.376	.854	.570	.600	NE	NE	NE	25	35	45	35.0	N. 45 E.	0	0	0	.150	....
.597	.310	.638	.515	NE	NE	Calm	4	35	0	13.0	N. 45 E.	0	1	0	.240	....
.677	.472	.684	.611	Calm	Calm	Calm	0	0	0	0.0	Calm	0	2	0	.155	....
.543	.455	.505	.501	Calm	....	Calm	0	....	0	0.0	Calm	10	10	0	.110	....
.411	.493	.472	.459	NE	NE	NE	4	60	75	46.3	N. 45 E.	10	10	10	.140	....
.677	.388	.307	.457	NE	NE	NE	35	12	12	19.7	N. 45 E.	0	0	0	.125	....
.418	.325	.461	.399	NE	Calm	Calm	12	0	0	4.0	N. 45 E.	0	0	0	.205	....
.677	.559	.664	.633	....	....	....	....	....	....	9.2	N. 46 E.	5.4	3.5	2.8	3.296	1.04
.399	.422	.307	.376	SW	SE	Calm	12	4	0	4.2	S. 27 W.	0	4	1	.170	....
.836	.677	.762	.758	NE	....	NE	35	....	25	30.0	N. 45 E.	3	10	0	.320	....
.829	.836	.914	.860	NE	NE	NE	2	2	25	9.7	N. 45 E.	10	10	9	.090	.32
.914	.916	.916	.915	NE	NE	NE	12	12	4	9.3	N. 45 E.	10	10	10	.005	.56
.910	.948	.645	.834	NE	NE	NE	35	60	35	43.3	N. 45 E.	10	10	10	.000	.71
.359	.494	.483	.445	NE	NE	NE	75	75	35	61.7	N. 45 E.	5	0	0	.000	....
.607	.267	.572	.482	Calm	NE	Calm	0	35	0	11.7	N. 45 E.	0	0	0	.215	....
.613	.240	.561	.471	Calm	W	....	0	12	....	4.0	West	0	0	8	.215	....
.535	.606	.840	.694	NW	E.NE	Calm	4	4	0	1.4	N. 12 E.	10	9	1	.280	....
.761	.914	.920	.865	S.SW	SW	NE	2	2	25	7.0	N. 47 E.	9	8	10	.095	.75
.923	.892	.925	.913	N	Calm	N	4	0	2	2.0	North	10	10	10	.020	.90
.896	.350	.681	.642	Calm	W	Calm	0	12	0	4.0	West	9	8	0	.000	....
.738	.681	.853	.757	Calm	E	NE	0	2	4	1.8	N. 60 E.	9	4	1	.175	.01
.646	.483	.698	.609	E	NE	Calm	4	4	0	2.4	N. 67 E.	0	0	0	.100	....
.777	.450	.599	.609	Calm	SW	SW	0	35	12	15.7	S. 45 W.	10	5	0	.145	....
.561	.353	.772	.562	NW	NW	Calm	12	25	0	9.3	N. 19 E.	0	8	1	.185	....
.563	.606	.767	.645	N	Calm	Calm	12	0	0	4.0	North	0	9	0	.145	....
.646	.422	.583	.550	NW	S.SE	S	2	35	2	8.3	S. 19 E.	0	0	0	.155	....
.493	.340	.543	.459	W	SW	Calm	4	12	0	5.0	S. 56 W.	0	0	3	.175	....
.543	.357	.441	.447	W	SW	SW	12	35	4	16.0	S. 55 W.	0	0	0	.180	....
.518	.464	.653	.545	SW	SE	Calm	4	12	0	4.2	S. 27 E.	0	0	0	......	....
.725	.464	.713	.634	Calm	SE	Calm	0	12	0	4.0	S. 45 E.	10	1	0	.235	....
.874	.613	.886	.791	Calm	W	SW	0	35	4	12.7	S. 86 W.	9	7	10	.170	.36
.659	.525	.769	.651	SW	W	Calm	4	25	0	9.3	S. 84 W.	10	3	7	.125	.06
.872	.809	.802	.828	Calm	NE	Calm	0	12	0	4.0	N. 45 E.	10	10	3	.135	....
.929	......	......	.929	NE	NE	Calm	4	4	0	2.7	N. 45 E.	5	10	6	.100	.06
.802	.575	.627	.668	NE	NE	NE	12	12	4	9.3	N. 45 E.	9	8	9	.025	....
.736	.761	.502	.673	Calm	NE	NE	0	25	12	12.3	N. 45 E.	3	9	10	.090	.07
.692	.756	.880	.776	NE	SE	Calm	2	2	0	0.9	East	10	10	10	.065	.92
.969	.865	.940	.925	Calm	NW	Calm	0	4	0	1.3	N. 45 W.	10	10	10	.055	.25
.926	.932	.874	.911	NE	SE	NW	4	2	12	3.6	N. 24 W.	10	10	1	.000	.24
.718	.567	.714	.666	....	....	....	....	....	....	4.7	N. 37 E.	6.1	5.9	4.1	3.670	5.21

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
					°	°	°	°	°	°	°	°	°				
1863. June 1	28.943	29.046	29.159	29.049	46	51	50	53	59.5	53	55.2	61	48	.219	.262	.321	.267
2	29.212	29.254	29.366	29.277	50	53	46	51	62	49	55.	66	48	.308	.284	.271	.288
3	29.442	29.402	29.359	29.401	47	52	53	54	60	56	56.7	64	43	.213	.282	.363	.286
4	29.312	29.236	29.388	29.312	53	58	51	58	71	55	61.3	73	51	.336	.310	.321	.322
5	29.334	29.421	29.499	29.418	47	48.5	46	48.5	51	48	49.2	57	46	.303	.308	.284	.298
6	29.627	29.682	29.724	29.678	45	48	45	47.5	55	50	50.8	55	45	.266	.243	.234	.248
7	29.730	29.712	29.674	29.705	45	49	44	51	59	51	53.7	....	....	.220	.216	.196	.211
8	29.697	29.646	29.541	29.628	46	51	48	56	64	53	57.7	66	43	.179	.202	.296	.226
9	29.552	29.459	29.414	29.475	50	53	51	56	64	57	59.	66	41	.282	.257	.295	.278
10	29.352	29.298	29.273	29.308	53	58	54.5	58	70	60	62.7	71	49	.336	.323	.352	.337
11	29.281	29.375	29.341	29.332	58	62	56	65	75.5	61	67.2	78	57	.389	.376	.383	.389
12	29.461	29.471	29.498	29.477	51	56	53	58	64	58	60.	67	53	.365	.343	.336	.348
13	29.518	29.510	29.508	29.512	57	63	62	63	73	68	68.	77	62	.386	.442	.476	.435
14	29.531	29.469	29.407	29.469	62	72.5	67	70	89	76	78.3	90	60	.449	.575	.542	.522
15	29.445	29.448	29.440	29.444	69	62	56	79	71	65	71.7	89	64	.574	.436	.350	.447
16	29.485	29.368	29.264	29.372	59	65	70	65	79	79	74.3	90	61	.420	.431	.612	.488
17	29.242	29.252	29.245	29.246	68	63	60	77	83	71	77.	81	70	.564	.308	.371	.414
18	29.148	29.077	29.138	29.121	60	60	54	72	81	65	72.7	82	63	.358	.238	.272	.289
19	29.121	29.060	29.133	29.105	55	67	51	63	72	58	64.3	76	52	.327	.595	.282	.401
20	29.156	29.206	29.228	29.197	50	53	54	51	61	58	57.7	65	52	.308	.297	.365	.323
21	29.211	29.218	29.241	29.223	53	56	54	57	67	58	60.7	68	53	.350	.303	.365	.339
22	29.306	29.371	29.241	29.366	52	56	55	55	63	57	58.3	64	53	.349	.356	.407	.371
23	29.514	29.516	29.534	29.521	53	57	52	56	63	57	58.7	64	49	.363	.386	.322	.357
24	29.544	29.491	29.481	29.505	55	60	57	60	71	62	64.3	72	49	.367	.371	.399	.379
25	29.489	29.441	29.443	29.458	55	61	58	61	72	64	67.7	75	49	.354	.390	.403	.382
26	29.419	29.398	29.378	29.408	61	64	65	66	73	70	69.7	77	53	.470	.476	.550	.499
27	29.398	29.345	29.335	29.359	64	67	67	69	74	71	71.3	80	61	.529	.568	.608	.568
28	29.293	29.205	29.155	29.218	66	70	68	72	77	72	73.7	81	63	.559	.639	.631	.610
29	29.085	29.063	29.113	29.087	66.5	71	63	68	77	64	69.7	77	62	.630	.678	.562	.623
30	29.191	29.221	29.263	29.225	64	66	62.5	67	69.5	61	66.8	70	62	.556	.594	.546	.565
Means...	29.369	29.355	29.365	29.363	55.4	59.1	55.8	61.1	69.0	61.0	63.7	....	....	.377	.382	.390	.383

of the north and northwestern lakes, at Milwaukie, Wisconsin.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.544	.515	.798	.619	W	W	....	35	60	....	31.7	West....	5	5	0	.000	....
.738	.511	.781	.677	NW....	W	Calm..	4	12	0	5.2	N. 80 W.	0	9	0	.160	....
.552	.546	.809	.636	Calm...	SE....	Calm..	0	12	0	4.0	S. 45 E..	0	8	9	.130	....
.698	.408	.743	.616	Calm...	W	Calm..	0	12	0	4.0	West....	5	3	5	.145	....
.888	.824	.850	.854	NE	NE ...	Calm..	4	25	0	9.7	N. 45 E..	10	10	10	.180	.04
.811	.561	.646	.673	NE	NE ...	NE ...	12	25	12	16.3	N. 45 E..	10	2	0	.060	....
.590	.432	.525	.516	NE	NE ...	Calm..	12	4	0	5.3	N. 45 E..	0	0	3	.160	....
.399	.340	.667	.469	NE	Calm..	Calm..	25	0	0	8.3	N. 45 E..	0	0	0	.190	....
.627	.432	.634	.564	Calm...	Calm..	Calm..	0	0	0	0.0	Calm....	0	0	0	.215	....
.698	.441	.680	.606	Calm...	Calm..	Calm..	0	0	0	0.0	Calm....	5	8	1	.105	....
.631	.426	.713	.590	Calm...	SE....	Calm..	0	4	0	1.3	S. 45 E..	0	0	0	.135	....
.756	.575	.698	.676	NE	Calm..	Calm..	12	0	0	4.0	N. 45 E..	0	0	0	.260	....
.670	.545	.695	.637	Calm ..	SE....	Calm..	0	2	0	0.7	S. 45 E..	0	0	0	.210	....
.613	.421	.603	.546	Calm...	SW ...	SW ...	0	12	2	4.7	S. 45 E..	3	0	0	.200	....
.580	.576	.535	.564	NW....	NE ...	Calm..	12	25	0	9.3	N. 19 E..	0	0	0	.295	....
.680	.434	.618	.577	Calm...	SE....	SE....	0	2	2	0.9	South ...	0	0	0	.305	....
.608	.274	.490	.457	NW....	NW...	NW...	12	4	2	4.5	N. 45 W.	5	5	1	.270	....
.457	.225	.441	.374	W	W	Calm..	4	45	0	16.3	West....	2	0	1	.230	....
.568	.758	.584	.637	Calm ..	NW...	Calm..	0	35	0	11.7	N. 45 W.	0	7	10	.325	....
.738	.553	.756	.682	NW....	W	NW...	4	4	2	3.1	N. 63 W.	9	9	10	.205	....
.752	.459	.756	.656	W	W	SW ...	25	25	4	17.7	S. 87 W.	17	8	6	.110	.03
.805	.619	.874	.766	NW....	SE....	Calm..	12	4	0	2.7	N. 45 W.	10	8	8	.095	....
.809	.670	.692	.724	E	SE....	Calm..	2	4	0	1.8	S. 60 E..	0	5	0	.070	.14
.708	.499	.718	.639	Calm...	SE....	Calm..	0	12	0	4.0	S. 45 E..	0	1	0	.175	....
.659	.497	.675	.610	Calm...	SE....	Calm..	0	2	0	0.7	S. 45 E..	0	0	0	.185	....
.735	.588	.751	.691	Calm...	SE....	Calm..	0	2	0	0.7	S. 45 E..	0	0	5	.215	....
.747	.677	.802	.742	S	SE....	Calm..	2	4	0	1.8	S. 30 E..	1	0	0	.220	....
.712	.689	.804	.735	Calm...	SE....	Calm..	0	4	0	1.3	S. 45 E..	0	2	9	.205	....
.920	.731	.943	.865	Calm...	Calm..	NE ...	0	0	4	1.3	N. 45 E..	10	5	10	.290	.58
.841	.822	.915	.859	Calm...	SE....	Calm..	0	4	0	1.3	S. 45 E..	10	10	10	.000	....
.718	.501	.706	.642	....	....	....	....	....	....	1.9	N. 46 W.	3.2	3.5	3.3	5.335	0.79

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.438	29.480	29.472	29.463	64	73	66	68	83	71	74.0	84	61	.543	.677	.572	.597
2	29.506	29.400	29.305	29.404	61	69	65	67	80	72	73.0	83	60	.457	.561	.517	.512
3	29.475	29.107	29.075	29.219	69	72	68	76	79	74	76.3	85	68	.614	.690	.604	.636
4	29.190	29.265	29.225	29.226	71	77	68	75	87	70	77.3	89	68	.704	.792	.658	.718
5	29.305	29.418	29.458	29.394	64	66	63	66	73	67	68.7	75	64	.569	.545	.522	.545
6	29.496	29.475	29.420	29.463	61	68	67	65	79	69	71.0	83	59	.483	.537	.635	.551
7	29.375	29.454	29.324	29.384	70	76	74	75	85	77	79.0	86	66	.666	.775	.799	.747
8	29.334	29.365	29.152	29.283	78	80	75	82	85	79	82.0	83	71	.904	.955	.814	.891
9	29.175	29.212	29.255	29.214	69	70	68	71	77	72	73.3	80	69	.682	.639	.631	.651
10	29.298	29.325	29.264	29.296	66	73	71	67	82	77	75.3	85	64	.626	.773	.678	.692
11	29.170	29.219	29.342	29.243	73	76	68	75	83	74	77.3	85	73	.784	.802	.604	.730
12	29.471	29.540	29.545	29.519	64	66	60	69	79	67	71.7	82	63	.529	.465	.425	.473
13	29.564	29.500	29.385	29.483	58	72	69	62	83	72	72.3	84	57	.429	.636	.668	.577
14	29.278	29.303	29.403	29.328	65	68	57	68	71	61	66.7	73	61	.577	.644	.412	.544
15	29.489	29.541	29.563	29.531	54	59	57	58	70	61	63.0	72	53	.365	.354	.412	.377
16	29.577	29.689	29.643	29.636	53	65	63	56	76	68	66.7	77	50	.363	.470	.509	.447
17	29.598	29.583	29.480	29.550	62	67	66	67	75	70	70.7	78	60	.489	.554	.586	.543
18	29.498	29.495	29.455	29.482	62	73	65	66	84	69	73.0	83	59	.496	.663	.564	.574
19	29.370	29.412	29.410	29.397	57	71	65	61	81	69	70.3	83	59	.412	.624	.564	.533
20	29.393	29.422	29.422	29.412	64	74	68	67	81	73	73.7	83	61	.556	.745	.618	.639
21	29.398	29.350	29.183	29.310	63	74	70	66	83	72	73.7	84	64	.535	.718	.706	.653
22	29.105	29.238	29.320	29.221	69	70	64	71	75	67	71.0	75	69	.682	.666	.556	.635
23	29.343	29.512	29.591	29.486	65	66	60	70	77	62	69.7	79	63	.550	.492	.491	.511
24	29.589	29.590	29.538	29.572	55	71	62	60	80	68	69.3	82	55	.367	.637	.476	.493
25	29.588	29.558	29.513	29.553	61	72	63	64	81	67	70.7	80	54	.497	.663	.522	.560
26	29.290	29.272	29.225	29.262	70	75	70	73	84	72	76.3	85	59	.693	.746	.706	.715
27	29.325	29.268	29.308	29.300	69	67	64	71	72	66	69.7	76	56	.682	.595	.569	.615
28	29.283	29.360	29.378	29.340	64	74	70	68	80	72	73.3	79	55	.543	.758	.706	.669
29	29.498	29.368	29.508	29.458	60	73	59	63	77	63	67.7	79	62	.478	.757	.447	.561
30	29.536	29.515	29.443	29.498	58	75	66	61	82	69	70.7	84	55	.443	.773	.599	.605
31	29.293	29.185	29.033	29.170	64	68	68	66	71	70	69.0	73	62	.509	.644	.658	.624
Means . . .	29.395	29.401	29.375	29.390	63.9	71.0	65.8	67.6	79.2	69.7	72.2	....	....	.557	.656	.588	.600
Sept. 1	29.070	29.181	29.354	29.202	62	51	47	64	60	51	58.3	70	50	.529	.255	.270	.351
2	29.427	29.454	29.477	29.452	44	58	51	49	63	52	54.7	64	41	.223	.416	.361	.333
3	29.425	29.381	29.370	29.392	49	70	65	52	77	70	66.3	74	39	.308	.639	.550	.499
4	29.368	29.410	29.498	29.425	....	63	70	62	65	72	66.3	79	63	....	.549	.706	.627
5	29.385	29.295	29.280	29.320	67	72	69	68	76	70	71.3	78	61	.648	.731	.695	.691
6	29.293	29.315	29.220	29.276	65	68	68	67	70	70	69.0	75	59	.591	.658	.658	.636
7	29.301	29.275	29.281	29.286	62	67	67	63	72	70	68.3	73	62	.542	.595	.622	.586
8	29.303	29.411	29.506	29.406	52	62	57	64	69	59	64.0	72	59	.229	.462	.439	.377
9	29.585	29.591	29.549	29.575	49	68	59	52	74	61	62.3	75	48	.308	.604	.473	.462
10	29.509	29.580	29.488	29.526	55	72	68	58	79	71	69.3	80	47	.393	.690	.644	.576
11	29.388	29.335	29.253	29.325	67	70	69	68	75	70	71.0	76	65	.648	.666	.695	.670
12	29.517	29.496	29.627	29.546	50	53	48	53	60	50	54.3	71	49	.321	.310	.309	.313
13	29.734	29.666	29.600	29.667	44	54	51	46	59	52	52.3	61	41	.262	.351	.361	.325
14	29.546	29.575	29.548	29.556	56	67	62	58	74	65	65.7	75	40	.422	.568	.516	.502
15	29.593	29.604	29.604	29.600	66	63	60	68	66	62	65.3	72	61	.612	.536	.491	.546
46	29.592	29.443	29.501	29.512	54	62	62	55	67	65	62.3	69	52	.404	.489	.516	.470
17	29.298	29.196	29.094	29.196	65	62	65	65	62	65	64.0	71	63	.617	.556	.617	.597
18	29.254	29.398	29.481	29.411	56	60	57	59	62	60	60.3	66	57	.409	.491	.426	.442
19	29.604	29.596	29.539	29.579	56	64	54	58	68	56	60.7	72	54	.422	.543	.391	.452
20	29.493	29.483	29.509	29.495	60	66	59	63	70	60	64.3	72	49	.478	.586	.487	.517
21	29.493	29.503	29.453	29.483	60	67	63	63	73	70	68.7	74	48	.478	.581	.482	.514
22	29.491	29.543	29.591	29.542	60	66	63	66	73	70	69.7	76	62	.438	.581	.482	.500
23	29.433	29.290	29.296	29.343	66	68	54	69	74	55	66.0	76	55	.599	.604	.404	.536
24	29.514	29.504	29.525	29.514	47	57	49	49	60	51	53.3	67	43	.297	.426	.321	.348
25	29.524	29.401	29.404	29.443	52	59	57	55	62	61	59.3	66	39	.349	.460	.412	.407
26	29.417	29.441	29.378	29.412	49	62	53	51	67	55	57.7	70	45	.321	.489	.376	.395
27	29.342	29.205	29.291	29.279	49	65	64	51	70	67	62.7	72	43	.321	.550	.556	.475
28	29.343	29.295	29.286	29.308	64	66	65	65	71	66	67.3	72	42	.583	.572	.604	.586
29	29.376	29.368	29.401	29.382	51	60	57	53	62	58	57.7	67	51	.348	.491	.452	.430
30	29.406	29.417	29.317	29.380	56	56	56	57	56	57	56.7	59	48	.436	.449	.436	.440
Means....	29.437	29.442	29.424	29.428	56.3	63.3	59.6	59.0	67.9	62.0	63.0	....	....	.432	.529	.492	.486

of the north and northwestern lakes, at Grand Haven, Wisconsin.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky,) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°		7 a. m.	2 p. m.	9 p. m.		
.793	.600	.754	.719	Calm	W	W	0	4	2	2.0	West		0	2	0	......	....
.690	.548	.648	.629	E	NW	E	4	4	2	1.4	N. 49 W.		0	3	9	......	....
.685	.697	.720	.701	SE	W	SW	4	25	25	15.0	S. 63 W.		7	10	0	......	....
812	.618	.898	.776	W	W	NW	2	2	25	9.3	N. 51 W.		0	4	10	......	....
891	.672	.790	.784	E	E	N	2	12	4	4.8	N. 74 W.		2	2	1	......	1.00
.783	.542	.896	.740	E	E	E	4	4	4	4.0	East		4	0	9	......	....
.768	.644	.862	.758	SW	W	SW	35	60	60	48.0	S. 62 W.		0	3	0	......	....
.828	.794	.822	.815	W	W	W	25	35	25	28.3	West		0	4	5	......	....
899	.689	.804	.797	SW	NW	Calm	4	25	0	8.5	N. 55 W.		10	2	0	......	.38
.946	.708	.731	.795	SE	W	SE	12	2	2	4.2	S. 39 E.		0	0	10	......	....
904	.711	.720	.778	SW	SW	SW	4	25	25	18.0	S. 45 W.		10	3	1	......	.40
747	.470	.642	.619	N	NW	E	4	12	4	4.4	N. 20 W.		0	1	0	......	....
772	.564	.852	.729	E	S	N	12	4	2	4.0	S. 80 E.		10	2	5	......	....
.843	.850	.769	.820	W	NE	NE	2	12	4	4.9	N. 40 E.		0	10	0	......	.12
756	.482	.769	.669	E	N	N	4	45	2	15.7	N. 5 E.		0	1	0	......	....
809	.524	.743	.692	E	SW	SW	2	4	2	1.6	S. 28 W.		8	1	2	......	....
740	.639	.799	.726	SW	SW	SW	4	25	4	11.0	S. 45 W.		6	6	8	......	....
.763	.596	.796	.718	E	NW	E	12	4	2	3.9	N. 76 E.		2	3	0	......	....
.769	.590	.796	.718	Calm	W	E	0	4	2	0.7	West		0	2	1	......	....
.841	.704	.761	.772	Calm	SW	E	0	4	2	1.0	S. 16 W.		10	2	1	......	....
.838	.636	.900	.791	E	W	E	2	4	4	0.7	East		10	9	10	......	....
.899	.768	.841	.836	SW	NW	E	4	12	2	3.6	N. 58 W.		0	1	0	......	1.56
.751	.531	.884	.722	E	N	E	2	12	25	10.0	N. 66 E.		0	1	0	......	....
.708	.623	.695	.675	E	SW	E	25	4	2	8.1	S. 83 E.		9	4	0	......	....
.833	.627	.790	.750	Calm	W	W	0	12	4	5.3	West		4	6	0	......	....
.854	.640	.900	.798	W	W	Calm	4	35	0	13.0	West		2	2	10	......	.60
.899	.758	.891	.849	Calm	NW	Calm	0	12	0	4.0	N. 45 W.		0	4	0	......	....
.793	.741	.900	.811	Calm	W	SW	0	12	2	4.5	S. 84 W.		10	0	0	......	....
.831	.817	.776	.791	E	NE	NE	4	4	2	3.1	N. 63 E.		10	7	1	......	....
.825	.708	.846	.793	E	W	Calm	12	4	0	2.7	East		9	0	0	......	....
.891	.850	.898	.880	S	S	S	12	35	60	35.7	South		10	10	10	......	.20
.811	.656	.803	.751	....	....	....	....	....	....	3.7	S. 67 W.		4.3	3.4	3.0	......	4.26
.888	493	.722	.701	NE	NE	NE	12	60	35	35.7	N. 45 E.		10	3	6	......	....
.638	.723	.930	.764	N	W	Calm	2	4	0	1.5	N. 63 W.		0	0	0	......	....
.794	.689	.751	.744	W	W	S	2	25	25	12.3	S. 47 W.		0	2	0	......	....
......	.890	.900	.895	W	SW	Calm	35	45	0	24.5	S. 65 W.		0	5	10	......	....
.947	.815	.948	.903	S	S	SW	12	25	12	15.2	S. 11 W.		10	8	10	......	.20
.893	.898	.898	.896	Calm	W	SW	0	4	25	9.3	S. 51 W.		10	10	10	......	....
.942	.758	.848	.849	SW	W	W	25	12	25	19.0	S. 72 W.		10	3	0	......	....
.385	.653	.878	.639	NW	NW	Calm	35	4	0	13.0	N. 45 W.		0	0	0	......	....
.794	.720	.882	.798	Calm	W	Calm	0	4	0	1.3	West		0	0	0	......	....
.816	.697	.850	.787	E	W	Calm	2	2	0	0.0	....		0	0	0	......	....
.947	.768	.948	.888	S	SW	S	2	25	4	9.8	S. 37 W.		4	6	10	......	....
.798	.599	.856	.751	N	N	N	4	25	35	21.3	North		10	4	0	......	....
.843	.703	.930	.825	E	NE	E	25	25	4	16.7	N. 69 E.		0	4	0	......	....
.876	.677	.836	.796	Calm	W	E	0	4	2	0.7	West		3	2	0	......	....
.895	.838	.884	.872	S	E	E	2	12	25	12.5	S. 87 E.		10	10	10	......	....
.934	.740	.836	.837	NE	SE	E	12	12	25	14.0	East		10	10	3	......	....
1.000	1.000	1.000	1.000	S	Calm	Calm	4	0	0	1.3	South		10	10	10	......	....
.819	.884	.822	.842	N	NW	Calm	25	4	0	9.5	N. 6 W.		10	3	10	......	....
.876	.793	.872	.847	W	W	Calm	2	2	0	1.3	West		3	2	0	......	....
.831	.799	.940	.857	SW	W	Calm	12	12	0	7.4	S. 68 W.		3	2	0	......	....
.831	.716	.658	.735	Calm	W	S	0	4	12	4.2	S. 18 W.		0	0	0	......	....
.685	.716	.658	.686	S	S	S	25	25	4	18.0	South		3	3	0	......	....
.846	.720	.934	.833	SW	SW	N	12	12	4	7.2	S. 53 W.		7	5	10	......	....
.853	.822	.859	.845	N	N	N	4	12	2	6.0	North		0	0	0	......	....
.805	.828	.769	.800	Calm	W	SW	0	25	12	11.5	S. 76 W.		0	2	0	......	....
.859	.740	.869	.823	SE	W	Calm	2	12	0	3.7	S. 83 W.		0	0	0	......	....
.859	.751	.841	.817	E	SW	SW	2	12	2	4.2	S. 39 W.		0	2	0	......	....
.944	.754	.945	.881	SW	SW	Calm	12	25	0	12.3	S. 45 W.		8	10	10	......	....
.864	.884	.942	.897	E	Calm	SE	25	0	2	8.7	S. 87 E.		10	3	10	......	....
.936	1.000	.936	.957	E	E	E	25	12	12	16.3	East		10	10	10	......	....
.841	.769	.865	.825	....	....	....	....	....	....	1.2	S. 50 W.		4.7	3.9	3.9	......	.20

L.—Reductions of the monthly meteorological register of the survey

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Oct. 1	29.394	29.301	29.318	29.338	57	67	64	58	69	65	64.0	70	47	.452	.633	.583	.557
2	29.291	29.323	29.351	29.328	65	62	60	65	66	61	64.0	69	61	.617	.502	.505	.541
3	29.412	29.398	29.183	29.331	60	72	68	61	75	72	69.3	75	57	.505	.744	.631	.627
4	29.191	29.442	29.602	29.412	63	55	54	65	60	55	60.0	74	54	.549	.367	.404	.440
5	29.598	29.620	29.605	29.608	43	54	50	45	57	52	51.3	60	41	.251	.378	.334	.321
6	29.482	29.066	29.156	29.235	53	65	64	55	66	67	62.7	69	41	.376	.604	.556	.512
7	29.113	29.067	28.970	29.050	65	69	67	66	72	71	69.7	73	62	.604	.668	.608	.627
8	28.995	29.050	29.202	29.082	67	61	55	69	62	58	63.0	72	57	.635	.523	.393	.518
9	29.450	29.512	29.525	29.496	48	55	51	51	60	55	55.3	61	46	.296	.367	.321	.328
10	29.512	29.514	29.577	29.534	50	55	44	51	58	46	51.7	69	42	.348	.393	.262	.334
11	29.609	29.620	29.570	29.600	39	47	43	41	52	45	46.0	52	38	.212	.257	.251	.240
12	29.500	29.422	29.423	29.448	38	52	44	41	55	46	47.3	56	36	.190	.349	.262	.267
13	29.358	29.363	29.312	29.344	37	54	48	40	59	50	49.7	61	35	.181	.351	.309	.280
14	29.488	29.457	29.601	29.519	40	49	37	44	51	41	45.3	52	28	.195	.321	.168	.228
15	29.570	29.622	29.375	29.522	35	47	47	37	51	50	46.0	53	27	.178	.270	.283	.244
16	29.347	29.312	29.314	29.324	50	48	44	52	50	47	49.7	56	45	.334	.309	.249	.297
17	29.493	29.525	29.530	29.516	40	48	41	43	51	43	45.7	54	35	.208	.296	.231	.245
18	29.518	29.329	29.299	29.382	46	58	57	48	61	60	56.3	62	33	.284	.443	.426	.384
19	29.438	29.506	29.550	29.501	41	42	38	49	45	40	44.7	61	39	.223	.228	.203	.218
20	29.484	29.305	29.006	29.265	32	45	50	35	51	54	46.7	54	32	.142	.220	.308	.223
21	28.929	28.923	28.994	28.948	50	53	46	53	56	48	52.3	58	45	.321	.363	.284	.323
22	29.246	29.351	29.479	29.358	40	40	38	43	44	42	43.0	50	35	.208	.195	.177	.193
23	29.642	29.585	29.450	29.559	37	44	41	41	47	44	44.0	48	32	.168	.219	.218	.212
24	29.310	29.491	29.626	29.475	50	40	36	54	43	39	45.3	55	32	.308	.208	.173	.230
25	29.459	29.842	29.836	29.712	40	34	29	42	37	31	36.7	55	28	.221	.157	.137	.172
26	29.572	29.441	29.372	29.461	20	38	37	28	39	40	35.7	40	20	.017	.216	.181	.138
27	29.352	29.330	29.298	29.326	35	42	36	38	48	40	42.0	49	17	.165	.189	.160	.171
28	29.164	29.192	29.338	29.231	38	46	42	41	51	45	45.7	52	36	.190	.245	.228	.221
29	29.463	29.505	29.462	29.476	40	49	46	42	52	49	47.7	53	33	.182	.308	.271	.254
30	29.347	29.305	29.312	29.318	50	51	55	53	57	60	56.7	61	31	.321	.378	.367	.355
31	29.460	29.178	29.314	29.317	51	55	54	56	62	58	58.7	63	52	.308	.308	.365	.327
Means....	29.393	29.384	29.386	29.387	45.9	51.6	47.9	48.6	55.0	50.7	51.4	....	....	.296	.356	.317	.323
Nov. 1	29.265	29.258	29.375	29.299	51	54	46	54	57	48	53.0	59	47	.335	.378	.284	.332
2	29.271	29.202	29.238	29.237	40	37	37	43	39	41	41.0	50	38	.208	.194	.168	.190
3	29.312	29.467	29.518	29.432	36	39	34	40	44	35	39.7	45	34	.160	.173	.183	.172
4	29.444	29.334	29.307	29.362	29	46	43	32	51	45	42.7	52	29	.126	.245	.251	.207
5	29.338	29.485	29.558	29.460	41	43	33	44	47	34	41.7	51	26	.218	.225	.175	.206
6	29.451	29.168	29.248	29.289	26	35	32	27	39	34	33.3	40	23	.129	.152	.155	.145
7	29.460	29.510	29.608	29.526	30	35	30	30	39	32	33.7	39	21	.167	.152	.144	.154
8	29.555	29.527	29.535	29.539	21	35	30	24	40	33	32.3	39	18	.079	.139	.132	.117
9	29.546	29.584	29.628	29.586	31	41	36	33	45	39	39.0	46	18	.151	.205	.173	.176
10	29.646	29.484	29.357	29.496	32	40	40	36	45	43	41.3	47	11	.129	.182	.208	.173
11	29.165	29.035	29.265	29.155	47	48	40	51	49	41	47.0	51	39	.270	.322	.235	.276
12	29.393	29.471	29.467	29.444	33	34	34	36	37	35	36.0	42	29	.149	.157	.183	.163
13	29.536	29.514	29.516	29.522	35	37	40	36	41	44	40.3	45	20	.191	.168	.195	.185
14	29.564	29.596	29.541	29.567	34	38	25	36	40	26	34.0	45	20	.170	.203	.123	.165
15	29.973	29.953	29.906	29.944	20	32	31	23	35	33	30.3	35	18	.074	.142	.151	.122
16	29.814	29.225	29.185	29.408	30	37	37	31	42	39	37.3	42	17	.155	.155	.194	.168
17	29.698	29.727	29.724	29.716	38	44	40	39	46	42	42.3	47	33	.216	.262	.221	.233
18	29.193	29.133	29.425	29.250	39	43	33	40	45	44	43.0	47	31	.225	.251	.045	.174
19	29.343	29.273	29.321	29.312	40	39	38	42	42	40	41.3	45	28	.221	.199	.203	.108
20	29.162	29.217	29.338	29.239	32	36	31	34	40	34	36.0	42	27	.155	.160	.139	.151
21	29.347	29.260	29.203	29.270	29	35	40	30	36	42	36.0	44	25	.149	.191	.221	.187
22	29.304	29.323	29.348	29.325	35	37	31	37	38	31	35.3	44	30	.178	.207	.174	.186
23	29.584	29.601	29.452	29.546	30	32	32	31	35	37	34.3	37	29	.155	.142	.116	.138
24	29.270	29.138	29.143	29.184	36	38	37	38	42	42	40.7	47	27	.186	.177	.155	.173
25	29.179	29.233	29.338	29.250	36	31	32	39	35	34	36.0	43	24	.173	.128	.155	.152
26	29.379	29.326	29.291	29.332	31	32	32	32	33	33	32.7	34	22	.162	.168	.168	.166
27	29.015	28.845	28.923	28.928	32	29	28	33	30	29	30.7	34	24	.168	.149	.142	.153
28	28.888	28.649	28.849	28.795	32	30	29	35	33	30	32.7	35	24	.142	.132	.149	.143
29	29.068	29.158	29.233	29.146	26	32	31	27	35	32	31.3	36	23	.129	.142	.162	.144
30	29.215	29.195	29.293	29.234	29	31	32	30	32	32	31.3	36	24	.149	.162	.181	.164
Means...	29.379	29.329	29.371	29.360	33.4	37.3	34.5	35.4	40.4	36.8	37.5	....	....	.170	.182	.169	.174

of the north and northwestern lakes, at Grand Haven, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.937	.896	.944	.926	E	Calm	E	12	0	2	4.7	East	10	10	10	......	....
1.000	.786	.941	.909	SW	SW	Calm	4	4	0	2.7	S. 45 W	10	10	10	......	.21
.941	.858	.804	.868	Calm	SW	SW	0	4	35	13.0	S. 45 W	0	3	0	......	....
.890	.708	.934	.844	SW	W	W	60	90	4	47.8	S. 73 W	6	3	0	......	....
.840	.812	.861	.838	E	Calm	Calm	4	0	0	1.3	East	0	0	0	......	....
.869	.945	.841	.885	W	SW	SW	4	45	25	24.3	S. 47 W	10	10	10	......	....
.945	.852	.802	.866	SW	W	W	35	60	75	53.3	S. 81 W	10	3	0	......	.16
.896	.942	.816	.885	SW	W	SW	75	25	35	42.8	S. 53 W	10	10	10	......	.20
.790	.708	.743	.747	E	NE	E	12	4	2	5.7	N. 81 E	6	10	10	......	....
.929	.816	.843	.863	W	W	N	2	4	12	4.5	N. 27 W	10	10	3	......	....
.824	.660	.840	.775	E	NW	E	12	4	4	4.5	N. 78 E	0	2	0	......	....
.738	.805	.843	.795	E	W	Calm	2	4	0	0.7	West	0	0	0	......	....
.732	.703	.856	.764	E	SW	W	2	12	4	4.5	S. 54 W	0	3	2	......	....
.677	.859	.653	.730	NE	N	N	12	25	25	19.8	N. 8 E	8	2	0	......	....
.807	.722	.786	.772	N	E	W	25	25	4	11.0	N. 40 E	10	3	10	......	....
.861	.856	.772	.830	SW	W	SW	25	45	4	22.8	S. 73 W	10	8	3	......	.50
.750	.790	.833	.791	N	E	W	4	4	4	1.3	North	8	3	0	......	....
.850	.825	.822	.832	W	SW	W	12	35	75	39.0	S. 78 W	0	10	0	......	....
.638	.762	.820	.740	W	N	N	25	75	4	27.7	N. 18 W	8	4	2	......	....
.698	.590	.738	.675	S	W	SW	4	75	100	54.5	S. 63 W	8	6	10	......	....
.798	.809	.850	.819	W	W	N	12	35	100	37.0	N. 25 W	0	10	8	......	....
.750	.677	.661	.693	N	NW	NW	35	35	12	25.3	N. 26 W	10	10	4	......	....
.653	.772	.756	.727	Calm	S	S	0	4	12	5.3	South	10	10	10	......	....
.738	.750	.726	.738	SW	W	W	75	45	75	60.3	S. 73 W	10	10	10	......	....
.829	.712	.788	776	W	E	E	12	25	12	8.3	East	10	10	0	......	....
.110	.907	.732	.583	E	W	W	4	12	12	6.7	West	3	10	8	......	....
.719	.563	.645	.642	E	W	SW	4	12	12	6.3	S. 62 W	0	8	0	......	....
.738	.653	.762	.718	W	SW	SW	12	25	35	23.0	S. 52 W	10	4	0	......	....
.607	.794	.781	.727	SW	W	Calm	4	12	0	5.0	S. 79 W	2	3	10	......	....
.798	.812	.708	.773	S	SW	S	45	35	60	43.7	S. 11 W	10	5	0	......	....
.687	.687	.756	.710	SW	SW	S	60	90	60	65.7	S. 33 W	0	2	0	......	....
.776	.775	.795	.782	....	....	....	....	....	....	14.1	S. 71 W	6.1	6.2	4.2	......	1.07
.802	.812	.850	.821	W	W	W	12	2	2	5.3	West	4	0	10	......	....
.750	.816	.653	.740	E	W	W	2	12	60	23.3	West	10	10	10	......	....
.645	.597	.878	.713	NE	N	E	12	35	4	15.0	N. 16 E	5	3	6	......	....
.694	.653	.840	.729	SE	S	SE	4	25	2	9.8	S. 8 E	2	10	0	......	....
.756	.698	.895	.783	NE	N	N	35	45	35	35.7	N. 13 E	10	10	10	......	....
.880	.636	.792	.769	W	SW	E	4	45	25	11.2	S. 19 W	0	10	10	......	....
1.000	.636	.794	.810	E	NE	Calm	60	4	0	20.8	N. 88 E	3	3	0	......	.30
.610	.557	.703	.623	E	N	Calm	4	12	0	4.3	N. 18 E	2	9	2	......	....
.800	.684	.726	.737	Calm	W	NW	0	4	2	1.8	N. 75 W	3	0	0	......	....
.610	.607	.750	.656	E	W	SW	2	12	2	3.8	S. 83 W	0	0	0	......	....
.722	.926	.912	.853	S	SW	SW	45	75	25	45.2	S. 31 W	10	10	10	......	.28
.705	.712	.898	.772	SW	W	SW	4	35	90	40.5	S. 57 W	10	6	10	......	.58
.900	.653	.679	.743	SW	W	W	4	25	60	29.3	S. 88 W	8	5	10	......	...
.802	.820	.876	.833	E	NE	N	4	12	12	8.0	N. 31 E	10	10	0	......	.10
.598	.698	.800	.699	E	E	E	25	35	45	35.0	East	0	10	10	......	....
.893	.577	.816	.762	E	E	N	60	2	4	20.7	N. 86 E	10	10	10	......	....
.907	.843	.829	.860	E	SE	Calm	4	2	0	1.8	S. 75 E	10	10	10	......	.36
.910	.840	.157	.636	SE	SE	E	4	2	2	2.5	S. 56 E	10	10	10	......	....
.829	.744	.820	.798	NE	NE	NE	12	12	4	9.3	N. 45 E	10	10	10	......	....
.792	.645	.712	.716	NE	NE	N	25	75	25	39.7	N. 36 E	10	10	4	......	....
.890	.900	.829	.873	SE	W	W	4	12	25	11.3	S. 85 W	0	0	0	......	....
.807	.905	1.000	.904	NW	N	N	12	25	25	19.7	N. 8 W	10	6	10	......	....
.893	.698	.527	.706	N	W	S	12	12	45	11.7	S. 20 W	10	10	2	......	.80
.811	.661	.577	.683	S	S	W	75	90	60	58.7	S. 20 W	6	10	8	......	....
.726	.628	.792	.715	NW	N	N	4	12	4	6.3	N. 8 W	10	10	10	......	....
.896	.893	.893	.894	NW	W	SW	4	12	45	18.3	S. 58 W	10	10	9	......	.12
.893	.890	.887	.890	SE	SE	N	35	12	12	13.3	S. 57 E	10	10	10	......	...
.698	.703	.890	.764	SW	SW	W	25	12	25	19.3	S. 63 W	10	10	10	......	.32
.880	.698	.896	.825	W	S	S	4	2	12	4.8	S. 16 W	10	10	10	......	....
.890	.896	1.000	.929	E	NE	N	25	25	4	16.0	N. 63 E	10	10	10	......	...
.799	.734	.789	.774	....	....	....	....	....	....	2.1	S. 42 W	7.1	7.7	7.0	......	2.86

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.509	29.587	29.655	29.584	31	31	29	32	34	30	30.0	35	22	.162	.139	.149	.150
2	29.654	29.616	29.496	29.589	28	30	30	29	30	30	29.7	35	21	.142	.167	.169	.159
3	29.285	29.371	29.398	29.351	29	30	28	30	30	29	29.7	35	19	.149	.167	.142	.153
4	29.375	29.246	29.344	29.322	27	30	29	28	31	30	29.7	33	16	.136	.155	.149	.147
5	29.330	29.167	29.201	29.233	35	27	22	36	28	23	29.0	31	15	.191	.136	.107	.145
6	29.401	29.498	29.586	29.495	11	17	17	12	18	18	16.0	26	8	.061	.083	.083	.076
7	29.496	29.577	29.570	29.548	20	24	22	20	25	24	23.0	28	9	.108	.117	.095	.107
8	29.401	29.333	29.526	29.420	17	31	28	18	32	29	26.3	33	8	.083	.162	.142	.129
9	29.555	29.546	29.504	29.535	27	31	33	28	35	36	33.0	37	9	.136	.128	.149	.138
10	29.364	29.357	29.346	29.356	36	36	38	38	40	41	39.7	42	6	.186	.160	.190	.179
11	29.267	29.242	29.309	29.273	40	41	41	43	42	43	42.7	44	37	.208	.244	.231	.228
12	29.411	29.320	29.242	29.324	34	40	41	36	43	44	41.0	45	32	.170	.208	.218	.199
13	29.164	29.125	29.293	29.194	31	46	41	32	49	44	41.7	50	29	.162	.271	.218	.217
14	29.248	29.133	29.038	29 140	40	45	46	41	46	47	44.7	52	27	.235	.286	.297	.273
15	29.152	29.071	29.059	29.094	37	32	31	38	35	34	35.7	49	22	.207	.142	.139	.163
16	29.070	29.226	29.508	29.268	30	29	27	32	30	28	30.0	46	25	.144	.149	.136	.143
17	29.681	29.654	29.681	29.672	21	24	27	22	25	28	25.0	31	17	.101	.117	.136	.118
18	29.708	29.483	29.439	29.543	25	34	37	27	37	39	34.3	40	14	.129	.157	.194	.160
19	29.724	29.879	30.004	29.869	27	26	17	29	28	18	25.0	40	12	.124	.117	.083	.108
20	30.059	30.020	29.845	29.975	17	21	17	18	22	18	19.3	21	6	.083	.101	.083	.089
21	29.608	29.454	29.331	29.531	22	44	33	23	46	35	34.7	37	8	.107	.262	.162	.177
22	29.462	29.385	29.480	29.442	35	37	34	37	39	36	37.3	40	32	.178	.194	.170	.181
23	29.591	29.591	29.507	29.563	29	31	32	32	33	34	33.0	37	32	.126	.151	.155	.144
24	29.316	29.310	29.338	29.321	44	42	42	46	45	44	45.0	46	29	.262	.228	.241	.244
25	29.343	29.278	29.198	29.273	34	41	34	36	43	36	38.3	44	32	.170	.231	.170	.190
26	28.920	28.838	29.100	28.953	42	44	34	42	44	37	41.0	44	33	.267	.288	.137	.237
27	29.175	29.174	29.213	29.187	37	39	32	38	39	34	37.0	40	33	.207	.238	.155	.200
28	29.151	29.108	29.078	29.113	34	38	40	36	40	42	39.3	42	32	.170	.203	.221	.198
29	29.300	29.353	29.398	29.350	34	33	....	37	34	30	33.7	42	31	.157	.175	.....	.166
30	29.369	29.394	29.528	29.430	30	....	....	31	26	22	26.3	35	24	.155	....	.....	.155
31	29.586	29.615	29.620	29.607	20	32	31	34	33	33	33.3	35	19	....	.168	.151	.160
Means...	29.409	29.385	29.420	29.405	29.8	33.5	31.5	31.6	34.9	32.8	33.1	....	....	.157	.178	.161	.165
1863.																	
Jan. 1	29.564	29.470	29.378	29.471	27	34	36	29	38	37	34.7	39	25	.124	.144	.199	.156
2	29.238	29.042	29.093	29.124	37	40	42	38	41	45	41.3	45	31	.207	.235	.298	.223
3	29.205	29.072	28.978	29.085	41	50	49	47	51	50	49.3	52	42	.179	.348	.335	.287
4	28.768	28.878	28.941	28.862	38	33	37	40	38	40	39.3	50	35	.203	.123	.181	.169
5	29.007	28.975	29.008	28.997	35	37	33	38	40	35	37.7	65	33	.165	.181	.162	.169
6	29.040	29.084	29.367	29.164	25	22	24	26	23	25	24.7	37	17	.123	.107	.117	.116
7	29.491	29.570	29.614	29.558	21	21	25	22	22	26	23.3	28	16	.101	.101	.123	.108
8	29.571	29.484	29.556	29.537	20	24	19	21	25	20	22.0	27	15	.096	.117	.092	.102
9	29.570	29.528	29.346	29.481	24	32	32	25	35	33	31.0	36	14	.117	.142	.168	.142
10	28.967	28.832	29.022	28.940	33	32	29	35	34	33	33.0	36	28	.162	.155	.149	.155
11	29.080	29.199	29.408	29.229	24	26	27	26	28	27	27.0	36	24	.166	.117	.147	.123
12	29.362	29.346	29.562	29.423	21	22	26	22	23	27	24.0	37	22	.101	.107	.129	.112
13	29.433	29.375	29.183	29.330	24	24	44	25	26	47	32.3	48	23	.117	.106	.262	.162
14	29.143	29.124	29.204	29.154	41	27	25	44	28	26	32.7	47	20	.218	.136	.123	.159
15	29.205	29.076	29.083	29.121	....	25	27	23	26	28	27.0	29	18	....	.123	.136	.129
16	29.121	29.151	29.390	29.221	9	25	11	10	28	12	16.7	22	8	.051	.100	.061	.072
17	29.549	29.672	29.772	29.664	7	21	17	8	22	18	16.0	24	7	.048	.101	.083	.077
18	29.761	29.671	29.661	29.698	14	28	26	15	30	28	24.3	33	7	.071	.130	.117	.106
19	29.720	29.633	29.618	29.657	22	31	31	23	34	34	30.3	36	20	.107	.139	.139	.128
20	29.442	29.373	29.401	29.405	30	31	31	32	34	33	33.0	36	19	.144	.139	.151	.145
21	29.467	29.515	29.568	29.517	30	31	32	32	39	35	35.3	39	19	.144	.082	.142	.123
22	29.464	29.406	29.423	29.431	33	34	35	36	37	36	36.3	38	20	.149	.157	.191	.166
23	29.448	29.413	29.305	29.389	34	34	35	37	37	36	36.7	38	18	.157	.157	.191	.168
24	29.302	29.367	29.464	29.378	34	32	33	36	35	35	35.3	39	32	.170	.142	.162	.158
25	29.600	29.588	29.569	29.586	32	35	31	34	38	33	35.0	39	31	.155	.165	.151	.157
26	29.424	29.335	29.385	39.381	33	36	29	36	38	31	35.0	39	28	.149	.186	.137	.157
27	29.372	29.422	29.441	29.412	27	30	27	28	31	28	29.0	38	26	.136	.155	.136	.142
28	29.351	29.380	29.256	29.329	25	32	31	26	33	32	30.3	34	11	.123	.168	.162	.151
29	29.250	28.942	28.984	29.059	29	35	32	30	36	34	33.3	38	26	.149	.191	.155	.165
30	29.046	29.333	29.400	29.260	31	32	31	33	34	32	33.0	37	26	.151	.135	.162	.159
31	29.278	29.248	29.351	29.292	31	31	24	32	34	26	30.7	28	22	.162	.139	.106	.136
Means....	29.330	29.306	29.346	29.327	27.7	30.5	30.0	29.3	32.8	31.5	31.2	....	....	.136	.146	.154	.145

of the north and northwestern lakes, at Grand Haven, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky,) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1,000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.896	.712	.800	.833	W	N	NW	4	25	12	11.8	N. 21 W.	10	10	10	......	.26
.887	1.000	1.000	.962	W	W	W	2	25	45	24.0	West	10	10	9	......	....
.890	1.000	.887	.926	NW	W	W	45	25	12	25.2	N. 65 W.	10	10	9	......	....
.883	.893	.890	.889	S	S	NW	12	4	45	11.8	N. 64 W.	8	10	10	......	....
.900	.883	.854	.882	W	SW	NW	45	45	60	40.0	N. 85 W.	10	10	8	......	....
.804	.840	.840	.828	N	N	W	35	25	12	20.7	N. 11 W.	3	6	5	......	....
1.000	.872	.738	.870	W	NW	Calm	45	25	0	21.7	N. 74 W.	10	9	4	......	....
.840	.896	.887	.874	W	W	E	2	4	2	1.3	West	2	8	10	......	....
.883	.628	.705	.739	Calm	S	S	0	25	45	23.3	South	10	9	5	......	....
.811	.645	.738	.731	SW	S	S	35	45	60	43.7	S. 11 W.	0	0	0	......	....
.750	.914	.833	.832	SW	S	S	75	60	4	43.3	S. 24 W.	3	10	10	......	....
.802	.750	.756	.769	Calm	W	Calm	0	2	0	0.7	West	10	10	10	......	....
.896	.781	.756	.811	SW	W	S	12	60	35	27.0	S. 58 W.	10	3	10	......	....
.912	.921	.823	.885	Calm	Calm	SW	0	0	45	15.0	S. 45 W.	10	10	10	......	....
.905	.698	.712	.772	W	W	W	25	12	25	20.7	West	10	10	10	......	....
.794	.890	.883	.856	W	N	E	35	35	4	15.7	N. 42 W.	10	10	10	......	....
.860	.872	.883	.872	N	N	N	4	35	12	17.0	North	3	10	10	......	....
.880	.712	.816	.803	W	W	S	25	35	60	28.3	S. 45 W.	3	3	0	......	....
.775	.768	.840	.794	N	N	N	12	25	25	20.7	North	0	0	0	......	....
.840	.860	.840	.847	NE	N	E	4	12	4	5.4	N. 25 E.	0	0	0	......	....
.861	.843	.797	.805	W	W	W	12	25	4	13.7	West	10	10	0	......	....
.807	.816	.802	.808	W	W	N	25	12	12	13.0	N. 72 W.	10	10	10	......	....
.694	.800	.792	.762	N	E	E	4	12	45	19.0	N. 86 E.	10	5	10	......	....
.843	.762	.836	.814	SW	SW	W	25	25	45	29.0	S. 66 W.	10	5	8	......	....
.802	.833	.802	.812	SW	W	N	4	2	2	1.6	S. 80 W.	8	9	0	......	....
1.000	1.000	.712	.904	E	SE	SE	4	2	2	2.4	S. 67 W.	10	10	10	......	.30
.935	1.000	.792	.899	SW	NW	NW	12	12	12	9.0	N. 71 W.	9	9	9	......	.40
.802	.820	.829	.817	SW	SW	SW	45	45	60	50.0	S. 45 W.	10	3	0	......	....
.712	.895	......	.813	NW	NW	NE	12	4	25	9.8	N. 13 E.	3	9	3	......	....
.893	......	......	.893	N	N	N	60	45	12	39.0	North	9	8	0	......	....
......	.893	.800	.847	E	SW	SW	2	35	45	36.0	S. 44 W.	1	6	3	......	....
.851	.840	.818	.836	....	....	....	....	....	....	10.6	S. 81 W.	7.1	7.5	6.2	......	0.96
.775	.628	.903	.769	SW	SW	SW	25	75	60	53.3	S. 45 W.	3	9	10	......	....
.905	.912	.762	.860	SW	SW	SW	45	60	60	55.0	S. 45 W.	10	10	9	......	.30
.554	.929	.927	.803	SW	SW	SE	12	25	12	13.0	S. 27 W.	9	10	10	......	.32
.820	.537	.732	.696	NE	W	W	25	60	12	19.0	N. 72 W.	10	2	9	......	.60
.719	.732	.797	.749	SW	Calm	Calm	45	0	0	15.0	S. 45 W.	8	10	10	......	....
.876	.864	.872	.871	NW	S	W	35	25	35	19.2	West	10	10	10	......	....
.860	.860	.876	.865	W	SW	W	12	25	12	15.2	S. 67 W.	10	10	9	......	....
.855	.872	.850	.859	S	W	W	25	4	2	8.7	S. 14 W.	10	10	10	......	....
.872	.698	.893	.821	SE	SE	S	4	25	4	10.7	S. 40 E.	10	10	10	......	....
.797	.792	.890	.826	SW	W	W	25	35	75	42.7	S. 82 W.	10	10	10	......	....
.754	.768	1.000	.841	Calm	W	SW	0	12	12	7.5	S. 68 W.	10	10	8	......	....
.860	.864	.880	.868	W	N	Calm	4	12	0	4.3	N. 19 W.	6	5	0	......	....
.872	.754	.843	.823	NE	E	S	45	35	75	26.5	S. 57 E.	10	10	10	......	.60
.756	.883	.876	.838	W	W	W	35	25	25	28.3	West	10	10	10	......	....
......	.876	.883	.880	N	N	N	12	25	45	27.3	North	10	10	10	......	....
.791	.655	.804	.750	NE	N	N	12	25	12	15.7	N. 10 E.	9	2	0	......	....
.777	.860	.810	.826	N	S	W	4	25	4	7.1	S. 11 W.	0	10	0	......	....
.823	.782	.708	.791	S	SE	Calm	12	4	0	5.0	S. 11 E.	10	9	0	......	....
.864	.712	.712	.763	Calm	E	E	0	12	35	12.3	East	10	10	10	......	....
.794	.712	.800	.769	NE	SE	E	45	45	12	25.2	East	10	10	10	......	....
.794	.341	.698	.612	Calm	Calm	Calm	0	0	0	00.0	Calm	10	10	10	......	....
.705	.712	.900	.772	W	W	W	12	35	2	16.3	West	10	10	10	......	....
.712	.712	.900	.775	Calm	E	E	0	25	25	23.3	East	10	10	10	......	....
.802	.693	.797	.766	SW	SW	W	75	90	75	75.0	S. 59 W.	10	10	10	......	....
.792	.719	.800	.770	Calm	W	W	0	12	4	5.3	West	0	0	10	......	....
.705	.811	.788	.768	Calm	N	NW	0	4	4	2.4	N. 23 W.	10	10	9	......	....
.883	.893	.883	.886	N	N	NW	35	25	12	23.0	N. 7 W.	10	8	6	......	....
.876	.893	.896	.888	Calm	W	W	0	4	12	5.3	West	10	5	2	......	....
.890	.900	.792	.861	W	SW	SW	25	25	25	23.3	S. 60 W.	10	10	10	......	....
.800	.792	.896	.829	NE	NW	NW	12	25	35	20.3	N. 33 W.	10	10	10	......	....
.896	.712	.754	.787	W	SW	Calm	75	25	0	31.3	S. 79 W.	3	10	0	......	....
.806	.770	.839	.805	....	....	....	....	....	....	10.1	S. 68 W.	8.6	8.7	7.8	......	1.82

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	28.925	28.890	29.107	28.974	32	28	17	34	30	18	27.3	37	12	.142	.130	.083	.118
2	29.498	29.571	29.583	29.551	2	4	6	3	5	7	5.0	18	4	.026	.041	.046	.041
3	29.647	29.731	29.852	29.743	3	10	7	4	11	8	7.7	13	2	.038	.057	.048	.048
4	29.880	29.787	29.709	29.792	3	14	10	4	15	11	10.0	12	4	.038	.071	.057	.055
5	29.723	29.394	29.423	29.513	8	21	13	9	22	14	15.0	23	7	.051	.101	.067	.073
6	29.419	29.405	29.372	29.398	12	32	11	13	34	12	19.7	32	4	.063	.142	.061	.089
7	29.388	29.315	29.548	29.417	29	32	30	30	34	31	31.7	36	20	.149	.142	.155	.149
8	29.702	29.668	29.702	29.691	28	31	29	29	33	30	30.7	35	20	.142	.151	.149	.147
9	29.493	29.128	29.444	29.355	24	38	31	25	39	32	32.0	39	19	.117	.216	.162	.165
10	29.650	29.731	29.688	29.690	25	29	27	26	30	28	28.0	33	19	.123	.149	.136	.136
11	29.575	29.483	29.430	29.496	24	30	30	25	33	32	30.0	33	22	.117	.132	.151	.133
12	29.385	29.451	29.578	29.471	27	28	20	28	29	22	26.3	36	16	.136	.142	.085	.121
13	29.663	29.646	29.566	29.625	11	24	26	12	26	27	21.7	37	13	.061	.106	.129	.099
14	29.295	28.932	29.157	29.128	33	38	34	34	42	35	37.0	42	24	.168	.177	.183	.176
15	29.421	29.551	29.655	29.542	24	28	29	25	30	30	28.3	37	23	.117	.130	.149	.132
16	29.773	29.797	29.698	29.756	17	26	28	18	28	29	25.0	32	13	.083	.117	.142	.114
17	29.555	29.454	29.435	29.481	26	35	26	27	41	28	32.0	38	20	.129	.126	.136	.130
18	29.447	29.241	29.210	29.299	29	36	35	30	40	37	35.7	42	13	.149	.160	.178	.162
19	29.072	28.947	28.944	28.988	34	36	34	35	39	36	36.7	39	34	.183	.173	.170	.175
20	29.292	29.475	29.648	29.472	27	28	23	28	29	24	27.0	36	22	.136	.142	.112	.130
21	29.826	29.814	29.611	29.750	17	22	17	18	23	18	19.7	25	12	.083	.107	.083	.091
22	29.497	29.542	29.610	29.550	16	27	23	17	28	24	23.0	50	14	.078	.136	.112	.109
23	29.701	29.638	29.568	29.636	13	30	26	14	32	28	24.7	32	11	.067	.144	.117	.109
24	29.480	29.528	29.528	29.512	23	35	32	24	36	33	31.0	38	22	.112	.191	.168	.157
25	29.505	29.434	29.315	29.418	24	39	34	25	41	38	34.7	41	22	.117	.212	.144	.158
26	28.949	28.932	29.019	28.967	39	37	37	40	38	38	38.7	46	21	.225	.207	.207	.213
27	29.230	29.500	29.618	29.456	32	35	28	33	37	29	33.0	38	28	.168	.178	.142	.163
28	29.545	29.407	29.283	29.412	26	39	35	27	41	36	34.3	42	24	.129	.212	.191	.144
Means....	29.484	29.442	29.475	29.467	21.7	29.0	24.9	22.7	30.9	26.3	26.6	....	....	.109	.142	.127	.126
March 1	29.185	29.189	29.266	29.216	29	37	34	32	38	35	35.0	39	24	.126	.207	.183	.172
2	29.157	29.085	29.326	29.189	31	33	31	33	35	32	33.3	38	23	.151	.162	.162	.158
3	29.378	29.487	29.629	29.498	19	26	17	20	28	18	22.0	32	12	.092	.117	.083	.097
4	29.786	29.750	29.738	29.758	16	28	27	17	29	28	21.3	31	11	.078	.142	.136	.119
5	29.581	29.292	29.079	29.317	26	30	33	27	32	34	31.0	35	10	.129	.144	.175	.149
6	29.184	29.395	29.478	29.352	34	32	28	35	34	29	32.7	37	23	.183	.155	.142	.160
7	29.374	29.317	29.328	29.340	18	31	29	19	33	30	27.3	33	20	.087	.151	.149	.129
8	29.072	29.044	29.125	29.080	28	32	29	29	35	31	31.7	35	19	.142	.142	.137	.140
9	29.287	29.434	29.458	29.393	20	24	27	21	25	28	24.7	32	19	.096	.117	.136	.116
10	29.383	29.218	29.186	29.262	31	34	33	33	38	35	35.3	40	18	.151	.144	.162	.152
11	29.305	29.392	29.478	29.392	27	29	27	28	30	28	28.7	38	21	.136	.149	.136	.140
12	29.563	29.631	29.674	29.623	18	21	19	19	23	20	20.7	37	15	.087	.090	.092	.090
13	29.601	29.618	29.551	29.590	24	27	20	26	28	21	25.0	30	10	.106	.136	.096	.113
14	29.408	29.187	29.218	29.271	20	30	30	22	35	31	29.3	32	12	.085	.109	.155	.116
15	29.101	29.168	29.350	29.206	29	33	31	30	38	34	34.0	39	14	.149	.123	.139	.137
16	29.480	29.535	29.518	29.511	20	35	34	21	40	36	32.3	42	25	.096	.139	.170	.135
17	29.344	29.295	29.293	29.311	30	41	36	31	43	38	37.3	41	22	.155	.231	.186	.191
18	29.514	29.673	29.654	29.614	30	36	36	32	40	37	36.3	40	20	.144	.160	.199	.168
19	29.583	29.661	29.651	29.632	25	32	33	27	40	35	34.0	37	20	.112	.077	.162	.117
20	29.623	29.492	29.474	29.530	26	31	32	27	37	34	32.7	48	24	.129	.105	.155	.130
21	29.370	29.388	29.393	29.384	30	37	34	32	39	36	35.7	40	23	.144	.194	.170	.169
22	29.416	29.281	29.248	29.315	33	41	38	35	44	41	40.0	41	29	.162	.218	.190	.190
23	29.204	29.120	29.147	29.157	38	41	41	40	43	42	41.7	48	27	.203	.231	.244	.226
24	28.954	29.122	29.095	29.024	35	38	36	36	40	37	37.7	43	32	.191	.203	.199	.198
25	29.106	29.105	29.148	29.120	28	32	30	31	34	33	32.7	42	28	.119	.155	.132	.135
26	29.337	29.352	29.448	29.379	36	32	27	38	34	28	36.7	38	23	.186	.155	.136	.159
27	29.442	29.374	29.273	29.363	25	36	31	26	43	33	34.0	45	19	.123	.147	.151	.140
28	29.112	29.251	29.359	29.241	31	28	22	34	30	23	29.0	35	21	.139	.130	.107	.125
29	29.441	29.568	29.677	29.562	20	30	28	22	31	30	27.7	38	24	.085	.155	.130	.123
30	29.664	29.533	29.361	29.519	27	35	33	29	38	35	34.0	41	15	.124	.165	.162	.150
31	29.164	29.338	29.491	29.331	30	27	20	31	28	21	26.7	38	19	.155	.136	.096	.129
Means....	29.358	29.361	29.391	29.370	26.9	32.2	29.8	28.4	35.0	31.3	31.6	....	....	.131	.151	.150	.144

of the north and northwestern lakes, at Grand Haven, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Direction—from whence.				Humidity. Saturation = 1.000.			Velocity in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.698	.782	.840	.773	S	SW	W	75	90	100	71.5	S. 50 W.	10	10	10	......	....
.730	.750	.769	.750	W	W	W	9	45	12	45.7	N. 85 W.	10	10	10	......	....
.740	.797	.777	.771	N	N	NE	12	45	4	19.2	N. 3 E.	10	10	10	......	....
.740	.823	.797	.787	NE	SE	SE	4	25	60	28.5	S. 48 E.	10	10	9	......	....
.784	.860	.816	.820	E	NE	NE	25	35	12	22.3	N. 60 E.	10	10	0	......	....
.810	.698	.804	.771	E	Calm	S	2	0	35	11.7	S. 4 E.	9	9	10	......	....
.890	.698	.893	.827	SW	SW	S	75	35	4	37.3	S. 44 W.	5	10	0	......	....
.887	.800	.890	.859	NE	NE	N	25	12	35	22.3	N. 23 E.	10	10	10	......	....
.872	.907	.896	.893	NE	SW	W	45	60	75	28.7	S. 83 W.	10	10	10	......	.64
.876	.890	.883	.883	W	W	Calm	60	2	0	20.7	West	10	10	10	......	.30
.872	.703	.800	.792	Calm	S	Calm	0	12	0	4.0	South	8	10	10	......	....
.883	.887	.721	.830	N	N	N	25	4	4	11.0	North	10	10	10	......	....
.804	.754	.880	.813	W	E	E	2	12	45	18.3	East	9	10	0	......	....
.893	.661	.898	.817	SW	S	W	60	25	100	52.7	S. 65 W.	10	10	0	......	....
.872	.782	.890	.848	W	W	SW	75	35	75	57.3	S. 72 W.	4	8	10	......	.24
.840	.768	.887	.832	E	E	E	4	25	4	11.0	East	0	9	2	......	....
.880	.488	.883	.750	E	W	Calm	2	12	0	3.3	West	2	3	10	......	....
.890	.645	.807	.781	E	W	Calm	12	12	0	0.0	....	3	9	0	......	....
.898	.726	.802	.809	Calm	E	N	0	35	35	16.5	N. 45 E.	10	10	10	......	....
.883	.887	.868	.879	W	NW	N	45	35	60	36.7	N. 39 W.	10	3	10	......	....
.840	.864	.840	.848	E	E	E	45	60	75	60.0	East	8	9	10	......	....
.834	.883	.868	.862	E	N	Calm	90	12	0	30.3	N. 82 E.	10	0	0	......	....
.816	.794	.768	.793	E	W	Calm	2	12	0	3.3	West	0	2	0	......	....
.868	.900	.893	.887	Calm	SW	W	0	35	12	14.7	S. 56 W.	2	10	9	......	....
.872	.824	.628	.775	Calm	SW	S	0	25	40	9.3	S. 39 W.	0	8	10	......	....
.910	.905	.905	.907	Calm	S	NW	0	75	45	18.0	S. 36 W.	10	10	10	......	.24
.893	.807	.887	.862	N	N	Calm	25	12	0	12.3	North	10	5	0	......	....
.880	.824	.900	.868	SE	S	SE	12	25	12	15.3	S. 22 E.	2	10	10	......	....
.844	.789	.839	.824	....	....	....	....	....	....	5.8	S. 64 W.	7.2	8.4	6.8	......	1.42
.694	.905	.898	.832	Calm	S	Calm	0	4	0	1.3	South	10	10	4	......	....
.800	.797	.896	.831	NE	W	NE	25	4	60	27.7	N. 43 E.	10	10	10	......	....
.850	.768	.840	.819	N	N	N	12	12	4	9.3	North	9	9	0	......	....
.834	.887	.883	.868	SE	SW	Calm	35	12	0	12.3	S. 26 E.	10	4	0	......	....
.880	.794	.895	.856	SW	SW	SW	60	25	75	53.3	S. 45 W.	10	10	10	......	....
.898	.792	.887	.859	NW	W	N	35	25	4	19.0	N. 60 W.	4	9	2	......	....
.845	.800	.890	.845	NE	E	E	35	35	25	29.3	N. 74 E.	10	9	10	......	....
.887	.698	.788	.791	S	W	W	12	35	75	37.0	S. 84 W.	10	10	0	......	....
.855	.872	.883	.870	W	W	W	90	60	60	70.0	West	9	3	0	......	....
.800	.628	.797	.742	SW	W	SW	45	60	90	61.0	S. 59 W.	3	9	0	......	....
.883	.890	.883	.885	E	NW	W	4	35	12	13.7	N. 53 W.	9	4	10	......	....
.845	.730	.850	.808	Calm	N	E	0	35	4	12.0	N. 7 E.	10	10	10	......	.16
.754	.883	.855	.831	N	W	Calm	35	35	0	16.7	N. 45 W.	8	3	0	......	....
.721	.537	.893	.717	S	N	N	4	12	4	4.0	North	10	0	0	......	....
.890	.537	.712	.713	E	E	Calm	45	25	0	23.3	East	0	3	0	......	....
.855	.557	.802	.738	E	W	Calm	2	12	0	3.3	West	0	0	9	......	....
.893	.833	.811	.846	Calm	S	N	0	12	25	4.3	North	0	10	0	......	....
.794	.645	.903	.781	N	N	W	12	4	4	5.5	N. 14 W.	8	0	0	......	....
.761	.312	.797	.623	E	E	E	45	60	60	55.0	East	3	10	10	......	....
.880	.476	.792	.716	E	E	E	75	75	75	75.0	East	10	10	10	......	....
.794	.816	.802	.804	SE	S	Calm	35	12	0	14.7	S. 34 E.	10	10	10	......	....
.797	.756	.738	.764	E	E	E	45	60	45	50.0	East	10	3	10	......	....
.820	.833	.914	.856	E	E	E	45	60	12	39.0	East	10	10	10	......	.80
.900	.820	.903	.874	N	N	W	60	12	4	24.3	N. 3 W.	10	9	8	......	.16
.685	.792	.703	.727	N	N	N	12	25	4	13.7	North	10	10	10	......	....
.811	.792	.883	.829	N	NE	Calm	12	4	0	5.2	N. 10 E.	9	10	0	......	....
.876	.567	.800	.748	Calm	SW	Calm	0	4	0	1.3	S. 45 W.	0	3	2	......	....
.712	.782	.864	.786	N	N	NW	12	60	35	33.2	N. 14 W.	10	4	10	......	....
.721	.893	.782	.799	N	N	N	12	25	4	13.7	North	10	10	0	......	....
.775	.719	.797	.764	N	SW	W	4	25	4	8.5	S. 58 W.	0	3	9	......	....
.893	.883	.855	.877	N	SW	N	75	75	12	50.0	N. 21 W.	10	4	0	......	....
.819	.741	.838	.799	....	....	....	....	....	....	4.1	N. 31 E.	7.5	6.7	4.9	......	1.12

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	29.381	29.049	28.905	29.112	19	34	31	21	38	34	31.0	37	20	.080	.144	.139	.121
2	28.752	28.985	29.064	28.934	29	40	36	32	45	39	38.7	48	8	.126	.182	.173	.160
3	29.306	29.594	29.633	29.511	32	36	29	33	41	33	35.7	43	29	.168	.147	.114	.143
4	29.728	29.661	29.583	29.637	28	39	33	30	44	35	36.3	46	24	.130	.173	.162	.155
5	29.497	29.403	29.374	29.425	31	44	37	33	48	40	40.3	49	25	.151	.236	.181	.189
6	29.341	29.298	29.563	29.401	31	33	29	34	40	33	35.7	40	25	.139	.097	.114	.117
7	29.597	29.592	29.627	29.605	28	34	30	30	36	32	32.7	41	22	.130	.170	.144	.148
8	29.721	29.651	29.654	29.675	29	34	30	31	40	33	34.7	45	15	.139	.118	.132	.129
9	29.593	29.535	23.433	29.520	29	45	46	31	50	48	43.0	53	22	.139	.234	.284	.218
10	29.238	29.107	29.194	29.180	45	48	55	50	51	59	53.3	60	37	.234	.296	.380	.310
11	29.054	29.068	29.251	29.124	48	55	36	52	58	38	49.3	50	36	.282	.393	.186	.287
12	29.383	29.498	29.462	29.448	40	38	33	42	41	35	39.3	45	32	.221	.190	.162	.191
13	29.538	29.517	29.522	29.526	31	43	38	38	49	41	42.7	52	24	.093	.192	.190	.161
14	29.498	29.402	29.383	29.428	36	46	45	40	56	51	49.0	56	13	.160	.179	.220	.186
15	29.328	29.303	29.398	29.310	39	43	40	44	49	42	45.0	57	39	.173	.199	.221	.164
16	29.476	29.417	29.471	29.455	38	43	45	40	47	48	45.0	56	27	.203	.225	.260	.229
17	29.298	29.294	29.348	29.313	58	50	42	63	55	47	55.0	64	30	.416	.295	.232	.304
18	29.284	29.155	29.201	29.213	47	61	55	54	74	64	64.0	70	43	.231	.363	.314	.303
19	29.220	29.352	29.438	29.337	48	44	40	52	48	44	48.0	65	43	.282	.236	.195	.238
20	29.433	29.431	29.505	29.456	40	56	52	43	62	55	53.3	66	35	.208	.369	.349	.309
21	29.380	29.387	29.440	29.402	44	50	46	46	53	47	48.7	55	33	.262	.321	.297	.293
22	29.391	29.362	29.380	29.378	46	48	47	47	50	49	48.7	51	29	.297	.309	.297	.301
23	29.339	29.288	29.323	29.317	46	48	43	48	50	46	48.0	50	28	.284	.309	.238	.277
24	29.387	29.320	29.372	29.360	48	50	50	51	53	58	54.0	61	30	.296	.321	.255	.291
25	29.512	29.480	29.541	29.511	41	43	42	46	49	44	46.3	57	37	.192	.199	.241	.211
26	29.604	29.561	29.522	29.562	45	50	47	48	58	49	51.7	55	34	.260	.255	.297	.271
27	29.503	29.397	29.320	29.403	40	54	49	43	58	55	52.0	64	35	.208	.365	.269	.281
28	29.182	29.109	29.220	29.170	50	57	51	53	60	59	57.3	69	33	.321	.426	.269	.339
29	29.104	29.230	29.262	29.199	43	50	54	47	55	56	52.7	64	38	.225	.295	.391	.304
30	29.417	29.382	29.383	29.394	45	50	43	49	59	49	52.3	66	42	.247	.242	.199	.229
Means....	29.382	29.360	29.392	29.377	39.1	45.5	41.8	42.4	50.6	45.4	46.1	....	....	.209	.250	.229	.229
May 1	29.344	29.396	29.279	29.340	39	50	50	45	57	57	53.0	75	39	.160	.268	.268	.232
2	29.302	29.298	29.317	29.306	50	57	48	55	67	56	59.3	75	38	.295	.333	.230	.286
3	29.291	29.206	29.212	29.236	40	50	49	48	57	55	53.3	61	39	.143	.268	.269	.227
4	29.142	29.143	29.191	29.159	43	45	44	47	50	48	48.3	58	30	.225	.234	.236	.232
5	29.157	29.251	29.336	29.248	42	40	37	46	44	41	43.7	56	34	.215	.195	.168	.193
6	29.346	29.384	29.427	29.386	37	44	42	42	52	47	47.0	55	33	.155	.183	.202	.180
7	29.479	29.326	29.380	29.395	44	46	44	50	54	49	51.0	63	37	.209	.206	.223	.213
8	29.507	29.517	29.350	29.458	45	54	50	57	60	58	58.3	67	32	.142	.338	.255	.245
9	29.360	29.331	29.304	29.332	44	61	53	49	69	68	62.0	70	46	.223	.430	.204	.286
10	29.250	29.241	29.292	29.261	50	56	58	56	67	63	62.0	69	42	.282	.303	.416	.334
11	29.320	29.377	29.383	29.360	47	48	46	53	50	49	50.7	67	43	.244	.309	.271	.275
12	29.488	29.489	29.487	29.488	43	58	48	46	62	52	53.3	66	41	.238	.429	.282	.316
13	29.410	29.356	29.352	29.373	46	53	45	49	59	50	52.7	60	38	.271	.323	.234	.276
14	29.461	29.512	29.517	29.497	41	46	52	46	53	59	52.7	63	47	.192	.219	.296	.236
15	29.495	29.333	29.023	29.284	42	43	55	47	52	57	52.0	60	33	.202	.160	.407	.256
16	29.094	29.209	29.283	29.195	50	55	43	53	61	48	54.0	63	42	.321	.354	.212	.296
17	29.335	29.396	29.492	29.408	47	48	42	52	65	49	55.3	58	40	.257	.243	.175	.225
18	29.584	29.551	29.533	29.556	41	57	48	48	61	53	54.0	56	40	.166	.412	.269	.282
19	29.557	29.481	29.417	29.485	48	53	51	55	64	58	59.0	66	33	.243	.257	.282	.261
20	29.517	29.506	29.524	29.516	53	54	55	58	62	65	61.7	74	48	.336	.312	.300	.316
21	29.543	29.541	29.496	29.527	60	60	59	68	68	68	68.0	83	48	.411	.411	.380	.401
22	29.528	29.535	29.493	29.519	60	64	62	68	72	69	69.7	88	46	.411	.489	.462	.454
23	29.446	29.356	29.327	29.376	58	57	49	69	63	54	62.0	83	41	.336	.386	.282	.335
24	29.276	29.204	29.214	29.231	56	58	49	62	63	55	60.0	65	40	.369	.416	.269	.351
25	29.217	29.266	29.309	29.264	50	56	55	55	63	60	59.3	68	38	.295	.356	.367	.306
26	29.346	29.300	29.374	29.340	54	63	56	61	74	61	65.3	72	51	.325	.429	.383	.379
27	29.496	29.404	29.448	29.449	55	65	62	62	76	70	69.3	77	46	.340	.470	.449	.420
28	29.480	29.390	29.315	29.395	60	60	67	68	71	74	71.0	80	44	.411	.371	.568	.450
29	29.266	29.180	28.946	29.131	57	67	60	63	71	66	66.7	78	37	.386	.608	.438	.477
30	28.893	28.837	28.887	28.872	[illegible]	64	54	66	73	58	65.7	75	54	.470	.476	.365	.437
31	28.866	28.831	28.858	28.852	54	57	60	58	64	67	63.0	73	50	.365	.373	.425	.388
Means....	29.348	29.327	29.315	29.330	48.9	54.4	51.3	54.8	62.0	57.5	58.1	....	....	.276	.340	.309	.308

of the north and northwestern lakes, at Grand Haven, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.712	.628	.712	.684	W	SW	S	12	75	90	52.3	S. 25 W.	10	7	9	......	....
.694	.607	.726	.676	W	N	Calm	12	25	0	9.3	N. 26 W.	10	2	9	......	....
.893	.567	.606	.689	N	N	N	25	60	4	29.7	North	0	2	0	......	....
.782	.597	.797	.725	Calm	W	Calm	0	25	0	8.3	West	0	0	0	......	....
.800	.704	.732	.745	Calm	SW	SW	0	25	12	12.3	S. 45 W.	0	9	10	......	....
.712	.393	.606	.570	N	N	N	25	45	12	27.3	North	10	8	0	......	....
.782	.802	.794	.793	N	N	N	35	25	12	24.0	North	0	0	0	......	....
.788	.476	.703	.650	N	NW	N	4	25	4	10.5	N. 34 W.	0	0	0	......	....
.788	.646	.850	.761	Calm	S	SE	0	4	4	2.4	S. 23 E.	0	3	9	......	....
.646	.790	.761	.732	S	S	S	12	25	12	16.3	South	10	10	10	......	....
.727	.816	.811	.785	SW	S	N	75	12	35	20.3	S. 60 W.	10	9	10	......	.40
.829	.738	.797	.788	N	W	Calm	12	35	0	12.3	N. 71 W.	2	0	0	......	....
.408	.572	.738	.573	E	W	Calm	25	12	0	4.3	East	0	0	0	......	....
.645	.399	.590	.545	E	E	E	25	45	4	24.7	East	0	9	0	......	....
.597	.572	.829	.666	E	E	Calm	25	12	0	12.3	East	10	9	0	......	....
.820	.698	.777	.765	Calm	Calm	E	0	0	2	0.7	East	10	0	0	......	....
.723	.681	.624	.676	W	Calm	Calm	12	0	0	4.0	West	0	0	0	......	....
.552	.433	.527	.504	E	SE	S	25	45	35	29.0	S. 40 E.	0	0	10	......	....
.727	.704	.677	.703	S	Calm	Calm	25	0	0	8.3	South	10	9	0	......	....
.750	.665	.805	.740	E	SW	SE	25	12	25	14.3	S. 53 E.	10	6	3	......	.10
.843	.798	.923	.855	E	E	E	60	45	25	43.3	East	10	10	10	......	.14
.923	.856	.853	.877	E	E	E	12	35	45	30.7	East	10	10	10	......	.30
.850	.856	.767	.824	NE	NW	SW	25	35	12	12.3	N. 25 W.	10	4	0	......	....
.790	.798	.529	.706	Calm	NW	Calm	0	45	0	15.0	N. 45 W.	0	1	0	......	....
.617	.572	.836	.675	E	NW	Calm	35	35	0	8.2	N. 44 E.	0	0	0	......	....
.777	.529	.853	.720	Calm	NW	Calm	0	35	0	11.7	N. 45 W.	0	3	2	......	....
.750	.756	.620	.709	Calm	NW	Calm	0	12	0	4.0	N. 45 W.	0	3	0	......	....
.798	.822	.537	.719	Calm	E	SE	0	4	12	5.0	S. 56 E.	3	3	4	......	....
.698	.681	.872	.717	E	SW	N	12	60	25	11.7	S. 60 W.	4	3	0	......	....
.710	.484	.572	.589	E	W	Calm	12	12	0	0.0	....	0	0	0	......	....
.737	.654	.724	.705	....	....	....	....	....	....	1.3	N. 78 E.	4.3	4.0	3.2	......	.94
.533	.577	.577	.562	Calm	W	Calm	0	25	0	8.3	West	0	0	0	......	....
.681	.503	.512	.565	E	W	E	4	12	45	12.3	East	3	0	3	......	....
.426	.577	.620	.541	E	E	E	35	60	60	51.7	East	9	4	9	......	....
.698	.646	.704	.683	E	E	E	75	75	35	61.7	East	10	10	10	......	....
.691	.677	.653	.674	E	E	E	90	90	90	90.0	East	10	10	10	......	.20
.577	.472	.624	.558	E	E	E	25	45	4	24.7	East	10	9	0	......	.24
.581	.493	.638	.571	Calm	N	Calm	0	25	0	8.3	North	0	0	0	......	....
.305	.653	.529	.496	Calm	W	SW	0	4	25	9.3	S. 51 W.	0	0	2	......	....
.638	.607	.299	.515	S	SW	SW	12	4	25	12.8	S. 32 W.	10	2	9	......	....
.627	.459	.723	.603	S	SW	S	75	12	4	29.0	S. 6 W.	10	10	10	......	....
.606	.856	.781	.748	NE	E	NW	12	12	25	9.0	N. 6 E.	10	10	10	......	.20
.767	.772	.727	.755	Calm	SW	S	0	25	4	9.3	S. 39 W.	10	10	9	......	.86
.781	.647	.646	.691	S	W	Calm	25	12	0	9.3	S. 26 W.	8	4	10	......	....
.617	.544	.592	.584	E	N	Calm	12	35	0	12.3	N. 19 E.	0	3	0	......	.08
.624	.411	.874	.636	SE	S	S	4	12	35	16.7	S. 3 E.	2	10	4	......	....
.798	.659	.631	.696	SE	NW	Calm	12	12	0	0.0	....	0	3	0	......	....
.660	.561	.565	.575	NW	N	N	25	35	12	22.5	N. 15 W.	0	3	0	......	....
.494	.769	.667	.643	W	W	W	2	4	25	10.3	West	0	0	0	......	....
.561	.432	.584	.526	W	SW	SW	25	35	60	38.0	S. 54 W.	0	0	0	......	....
.698	.561	.487	.582	SW	SW	SW	45	60	35	46.7	S. 45 W.	0	0	0	......	....
.601	.601	.557	.586	S	Calm	Calm	35	0	0	11.7	South	0	0	2	......	....
.601	.624	.653	.626	Calm	W	Calm	0	4	0	1.3	West	2	0	0	......	....
.475	.670	.674	.606	Calm	S	Calm	0	25	0	8.3	South	0	10	0	......	....
.665	.723	.620	.669	S	S	Calm	25	60	0	28.3	South	9	10	2	......	.20
.681	.619	.708	.669	NE	NW	E	2	4	2	1.4	N. 8 E.	10	3	3	......	....
.606	.511	.713	.610	E	SE	E	12	25	4	12.7	S. 62 E.	3	4	9	......	.30
.612	.524	.613	.583	SE	E	SE	25	35	4	19.7	S. 70 E.	9	3	0	......	.60
.601	.490	.677	.589	SE	NW	Calm	12	25	0	4.3	N. 45 W.	0	2	10	......	....
.670	.802	.685	.719	SE	S	E	2	12	12	6.3	S. 45 E.	8	10	10	......	....
.735	.588	.756	.693	E	N	Calm	25	25	0	11.9	N. 45 E.	9	10	10	......	.06
.756	.625	.642	.674	S	SW	NW	2	12	60	20.0	N. 58 W.	10	10	10	......	.92
.625	.601	.634	.620	....	....	....	....	....	....	6.4	S. 51 E.	4.9	4.8	4.5	......	3.66

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	28.910	28.984	29.114	29.003	54	48	47	60	53	51	54.7	64	42	.338	.269	.270	.292
2	29.201	29.268	29.312	29.260	49	56	54	54	62	61	59.0	62	40	.282	.369	.325	.325
3	29.447	29.393	29.382	29.407	45	57	49	52	62	54	56.0	65	26	.207	.399	.282	.296
4	29.336	29.273	29.240	29.283	50	57	50	56	67	58	60.3	68	45	.282	.333	.255	.290
5	29.302	29.382	29.480	29.388	50	50	42	54	55	53	54.0	58	37	.308	.295	.123	.242
6	29.578	29.588	29.640	29.602	46	52	50	51	57	56	54.7	58	36	.245	.322	.282	.283
7	29.691	29.643	29.622	29.650	54	53	47	58	58	52	56.0	63	28	.365	.336	.257	.319
8	29.641	29.588	29.550	29.593	45	54	52	52	61	54	55.7	62	42	.207	.325	.362	.298
9	29.548	29.473	29.428	29.483	53	63	57	59	73	60	64.0	74	46	.323	.442	.426	.397
10	29.356	29.298	29.250	29.301	59	68	62	67	80	69	72.0	81	47	.393	.524	.462	.460
11	29.258	29.275	29.295	29.276	62	61	58	66	72	61	66.3	74	57	.502	.363	.443	.436
12	29.413	29.453	29.451	29.439	54	59	57	59	68	60	62.3	69	52	.351	.380	.426	.386
13	29.511	29.485	29.505	29.500	53	68	63	61	76	66	64.3	77	48	.297	.577	.536	.470
14	29.141	29.503	29.635	29.427	65	68	64	71	81	72	74.7	83	59	.537	.510	.489	.512
15	29.438	29.420	29.411	29.423	65	69	62	70	79	65	71.3	82	64	.550	.574	.516	.547
16	29.485	29.420	29.264	29.390	59	73	70	69	85	78	77.3	87	61	.367	.650	.625	.547
17	29.230	29.200	29.209	29.213	64	60	58	71	72	64	69.0	28	53	.503	.358	.403	.421
18	29.148	29.090	29.196	29.145	57	60	59	64	68	65	65.7	77	50	.373	.411	.420	.401
19	29.171	29.066	29.107	29.115	58	62	54	64	71	57	64.0	75	52	.403	.436	.378	.406
20	29.110	29.175	29.188	29.158	53	57	53	57	64	58	59.7	75	48	.350	.373	.336	.350
21	29.194	29.211	29.237	29.214	53	60	54	57	63	58	59.3	64	48	.350	.478	.365	.398
22	29.234	29.360	29.396	29.350	51	58	60	56	65	67	62.7	65	47	.308	.389	.425	.374
23	29.462	29.475	29.500	29.479	54	60	57	59	68	62	63.0	60	45	.351	.411	.399	.387
24	29.581	29.580	29.493	29.551	52	67	58	58	72	64	66.7	78	35	.309	.595	.403	.436
25	29.527	29.422	29.391	29.447	57	67	62	64	78	69	70.3	83	49	.373	.514	.462	.453
26	29.488	29.364	29.367	29.406	60	63	67	66	84	74	74.7	88	54	.438	.470	.568	.492
27	29.434	29.337	29.329	29.367	69	71	62	77	84	75	78.7	87	53	.601	.583	.382	.522
28	29.334	29.354	29.264	29.317	72	72	69	80	83	75	79.3	88	51	.677	.636	.628	.647
29	29.052	29.053	29.085	29.063	69	68	65	74	72	71	72.3	80	64	.641	.631	.537	.603
30	29.146	29.240	29.291	29.226	60	65	63	67	74	67	69.3	76	59	.425	.497	.522	.481
Means....	29.345	29.346	29.354	29.348	56.4	61.7	57.5	62.4	70.2	63.1	65.2	....	....	.388	.448	.410	.415
July 1	29.271	29.283	29.230	29.261	64	67	68	68	72	75	71.7	89	....	.543	.595	.591	.576
2	29.285	29.344	29.233	29.287	66	69	67	71	80	72	74.3	88	....	.572	.561	.595	.576
3	29.478	29.464	29.478	29.473	67	70	67	74	84	72	76.7	88	....	.568	.545	.595	.569
4	29.434	29.431	29.420	29.428	70	69	70	84	84	77	81.7	87	....	.545	.507	.639	.564
5	29.372	29.364	29.348	29.361	70	69	67	76	80	73	76.3	85	....	.652	.561	.581	.598
6	29.287	29.251	29.330	29.289	70	71	69	78	84	75	79.0	89	....	.625	.583	.628	.612
7	29.357	29.366	29.364	29.362	76	72	68	82	86	76	81.3	90	....	.816	.596	.577	.663
8	29.370	29.329	29.354	29.351	68	79	69	76	85	80	80.3	90	....	.577	.909	.561	.682
9	29.280	29.252	29.278	29.270	67	70	59	69	73	65	69.0	90	....	.635	.693	.420	.583
10	29.231	29.212	29.213	29.220	62	69	66	66	77	71	71.3	89	....	.502	.601	.572	.558
11	29.293	29.370	29.450	29.371	62	67	53	68	73	58	66.3	79	....	.476	.581	.336	.464
12	29.517	29.545	29.532	29.538	54	51	50	59	59	58	58.7	72	....	.351	.269	.255	.292
13	29.489	29.491	29.404	29.461	52	60	56	59	69	61	63.0	73	....	.296	.398	.383	.359
14	29.373	29.285	29.291	29.316	60	65	58	69	75	66	70.0	76	....	.398	.483	.376	.419
15	29.417	29.464	29.522	29.468	47	55	50	51	60	55	55.3	77	....	.270	.367	.295	.311
16	29.646	29.644	29.667	29.652	50	65	50	54	71	57	60.7	77	....	.308	.337	.268	.371
17	29.636	29.630	29.604	29.623	50	61	58	55	73	63	63.7	77	....	.295	.376	.416	.362
18	29.617	29.553	29.534	29.568	50	68	54	58	75	60	64.3	76	....	.255	.591	.338	.395
19	29.512	29.414	29.380	29.435	57	67	67	63	80	72	71.7	80	....	.386	.487	.595	.489
20	29.135	29.230	29.374	29.246	66	63	58	70	69	62	67.0	81	....	.586	.495	.429	.503
21	29.451	29.491	29.504	29.482	55	64	57	61	71	60	67.3	71	....	.354	.503	.426	.428
22	29.459	29.410	29.421	29.430	50	62	55	55	75	62	64.0	70	....	.295	.382	.340	.339
23	29.401	29.320	29.325	29.349	59	67	63	64	78	70	70.7	81	....	.433	.514	.482	.476
24	29.346	29.350	29.353	29.330	60	67	60	66	76	68	70.0	78	....	.438	.542	.411	.464
25	29.198	29.152	29.204	29.185	63	67	59	67	75	63	68.3	77	....	.522	.554	.447	.508
26	29.204	29.208	29.238	29.217	60	65	60	64	74	66	68.0	74	....	.465	.497	.438	.467
27	29.261	29.300	29.386	29.316	58	64	57	64	73	62	66.3	75	....	.403	.476	.399	.426
28	29.301	29.342	29.396	29.346	60	64	60	66	70	66	67.3	75	....	.438	.516	.438	.464
29	29.258	29.267	29.285	29.270	62	68	64	69	79	70	72.7	80	....	.462	.537	.516	.505
30	29.258	29.254	29.275	29.262	63	70	66	68	84	71	74.3	85	....	.509	.545	.572	.542
31	29.208	29.244	29.275	29.242	66	68	70	70	78	74	74.0	83	....	.586	.550	.679	.605
Means....	29.366	29.363	29.377	29.369	60.8	66.2	61.1	66.6	75.5	67.1	69.8	....	....	.470	.527	.471	.489

of the north and northwestern lakes, at Grand Haven, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.				7 a. m.	2 p. m.	9 p. m.		
											°						
.653	.667	.722	.681	SW	W	W	35	60	4	31.3	S. 75 W.		9	10	9	......	.08
.674	.665	.606	.648	S	W	W	12	12	4	6.7	S. 53 W.		9	1	0	......	....
.535	.718	.674	.642	N	W	W	12	4	4	4.8	N. 34 W.		2	1	2	......	....
.627	.503	.529	.553	SW	SW	S	25	12	12	15.5	S. 34 W.		9	7	10	......	....
.738	.681	.306	.575	E	N	N	12	12	4	6.7	N. 37 E.		10	10	0	......	.16
.633	.692	.627	.657	N	NW	N	12	25	25	19.2	N. 18 W.		0	2	0	......	.12
.765	.698	.660	.708	N	N	NW	4	35	4	14.0	N. 4 W.		0	2	0	......	....
.535	.606	.867	.669	N	NW	E.	2	12	2	4.1	N. 32 W.		0	0	0	......	....
.647	.545	.822	.671	N	W	W	2	2	2	1.5	N. 63 W.		0	0	3	......	....
.595	.512	.653	.587	NE.	W	E	2	2	2	0.7	N. 45 E.		0	3	9	......	....
.786	.433	.825	.681	W	W	W	2	4	12	6.0	West.		9	2	9	......	....
.703	.557	.822	.694	W	N	N	12	12	2	6.3	N. 41 W.		0	2	0	......	....
.553	.644	.838	.678	E	E	SW	2	4	2	1.6	S. 73 E.		0	0	1	......	....
.708	.483	.624	.605	W	W	W	2	4	4	3.3	West.		0	4	0	......	....
.751	.580	.836	.726	W	W	W	4	4	2	3.3	West.		0	10	0	......	....
.518	.540	.653	.570	E	SW	SW	12	2	12	3.4	S. 12 E.		0	10	0	......	....
.663	.457	.675	.598	S	NW	Calm	12	12	0	3.0	S. 68 W.		2	0	0	......	....
.625	.601	.680	.635	SW	S	S	4	25	4	10.7	S. 5 W.		0	4	10	......	....
.675	.576	.812	.688	SW	SW	W	12	35	25	22.3	S. 60 W.		0	9	2	......	....
.732	.625	.698	.692	W	SW	S	12	12	12	9.7	S. 45 W.		10	9	9	......	....
.752	.831	.765	.783	SW	SW	SW	25	60	25	36.7	S. 45 W.		10	8	2	......	....
.687	.631	.642	.653	N	N	Calm	12	25	0	12.3	North		10	3	0	......	....
.703	.601	.718	.674	N	NW	Calm	12	35	0	14.7	N. 34 W.		10	2	0	......	....
.641	.758	.675	.691	N	W	Calm	4	25	0	8.7	N. 81 W.		0	0	0	......	....
.625	.537	.653	.603	S	NW	Calm	4	12	0	3.2	N. 62 W.		0	3	3	......	....
.685	.403	.677	.588	N	NE	Calm	12	4	0	5.2	N. 10 E.		0	1	0	......	....
.648	.501	.441	.530	E	W	Calm	12	25	0	7.0	West.		3	2	2	......	....
.661	.564	.724	.650	Calm	W	E	0	25	4	7.0	West.		0	1	10	......	....
.764	.804	.708	.759	S	S	SE	25	12	4	13.3	S. 4 E.		9	10	10	......	.20
.642	.593	.790	.675	E	W	Calm	2	25	0	7.7	West.		2	4	2	......	....
.665	.600	.691	.652	....	....	....	....	....	....	5.4	S. 85 W.		3.5	4.0	3.1	......	0.56
.793	.758	.681	.744	E	SE	SW	12	35	25	15.5	S. 24 E.		8	2	9	......	....
.734	.548	.758	.687	SW	S	Calm	12	45	0	18.0	S. 9 W.		2	6	2	......	....
.677	.468	.758	.634	W	W	Calm	2	4	0	2.0	West.		3	2	0	......	....
.468	.435	.689	.531	W	W	Calm	25	12	0	12.3	West.		2	0	0	......	....
.727	.548	.716	.664	E	W	Calm	4	25	0	7.0	West.		0	2	0	......	....
.653	.501	.724	.626	W	W	Calm	4	25	0	9.7	West.		0	3	1	......	....
.747	.480	.644	.624	W	W	W	12	12	4	9.3	West.		2	3	1	......	....
.644	.756	.548	.649	NE	Calm	Calm	12	0	0	4.0	N. 45 E.		0	0	0	......	....
.890	.854	.680	.810	NE.	NW	W	4	4	2	2.0	N. 20 W.		10	10	10	......	....
.786	.648	.754	.729	SE.	S	S	4	12	4	6.2	S. 9 E.		10	10	10	......	....
.695	.716	.698	.703	E	NE	E	25	35	25	26.2	N. 72 E.		10	10	2	......	....
.703	.537	.529	.589	E	NW	Calm	35	35	0	9.0	N. 23 E.		9	10	0	......	....
.592	.564	.713	.623	E	W	Calm	12	4	0	2.7	East		0	0	0	......	....
.564	.558	.588	.570	W	SW	W	4	35	25	19.7	S. 65 W.		0	0	1	......	....
.722	.708	.681	.704	NE	N	N	12	25	12	15.2	N. 11 E.		10	3	0	......	....
.738	.708	.577	.674	Calm	W	E	0	12	4	2.7	West.		0	3	0	......	....
.681	.464	.723	.623	E	W	Calm	12	4	0	2.7	East		0	0	0	......	....
.529	.681	.653	.621	SE.	W	Calm	2	12	0	3.5	S. 82 W.		0	0	0	......	....
.670	.476	.758	.635	S.	S	S	12	12	12	12.0	South		8	10	10	......	.40
.799	.700	.772	.757	E	N	N	4	35	12	15.7	N. 5 E.		10	10	2	......	....
.659	.663	.822	.715	NE.	N	Calm	4	12	0	5.2	N. 10 E.		2	2	0	......	....
.681	.441	.612	.578	SE.	W	Calm	12	12	0	3.1	S. 22 W.		0	1	1	......	....
.727	.537	.658	.641	SW	SW	Calm	35	60	0	31.7	S. 45 W.		2	0	0	......	....
.685	.603	.601	.629	NW	W	SE.	4	2	12	2.3	S. 33 E.		9	9	10	......	....
.790	.639	.776	.735	SE.	S	S	12	4	12	8.7	S. 19 E.		10	10	10	......	.44
.780	.593	.685	.686	S.	S	SW	45	35	60	43.2	S. 19 W.		10	1	0	......	....
.675	.588	.718	.660	S.	W	Calm	35	12	0	12.3	S. 19 W.		0	3	0	......	....
.685	.704	.685	.691	S.	S	Calm	12	2	0	4.7	South		6	9	0	......	....
.653	.542	.704	.633	SW	SW	Calm	12	25	0	12.3	S. 45 W.		0	9	0	......	....
.743	.468	.754	.655	E	W	Calm	4	4	0	0.0	....		3	2	0	......	.06
.799	.574	.810	.728	S.	S	SW	35	45	3	30.0	S. 5 W.		10	2	3	......	....
.700	.595	.692	.662	....	....	....	....	....	....	4.8	S. 27 W.		4.4	4.2	2.3	......	0.90

LAKE HURON.

METEOROLOGICAL OBSERVATIONS.

Approximate height above the level of the sea, 574 feet.

Location of stations and names of observers.

Thunder Bay island, Michigan.—Lat. 45° 02′ 17″ N.; Long. 83° 09′ 26.5″ W.; height above the lake, 40 feet. Observer, J. J. Malden.

Tawas bay, Michigan.—Lat. 44° 15′ 12″ N.; Long. ——; height above the lake, 8 feet. Observer, John Oliver.

Detroit, Michigan.—Lat. 42° 19′ 58″ N.; Long. 83° 02′ 33″ W.; height above Detroit river, 30 feet. Observer, C. P. Rabaut and James M. Bigelow.

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.413	29.364	29.438	29.403	64.5	68.5	58	67	77	63	69.0	79	61	.573	.582	.416	.524
2	29.477	29.410	29.337	29.408	59	63	61	65	72	64	67.0	74.5	54.5	.420	.455	.497	.457
3	29.240	29.097	29.122	29.153	63.5	67.5	65	67	74	68.5	69.5	75.5	60	.539	.586	.570	.565
4	29.174	29.236	29.153	29.188	66.5	72	66	69	80	70	73.0	81.5	64	.617	.677	.586	.627
5	29.291	29.373	29.443	29.369	63	62	60	66	70	63.5	66.5	71.4	60.8	.536	.449	.471	.485
6	29.556	29.535	29.486	29.526	57.5	64.5	59.5	62	74	63.5	66.5	75.6	54	.414	.479	.456	.450
7	29.332	29.218	29.282	29.277	60.0	69.5	70	62	74	73	69.7	76	53	.491	.660	.693	.615
8	29.217	29.139	29.050	29.135	66.5	72	66.5	68	76	70.5	71.5	77.5	66	.630	.732	.597	.620
9	29.075	29.183	29.246	29.168	62	65	62	64	70	64.5	66.2	70.5	62.6	.529	.550	.522	.534
10	29.352	29.364	29.298	29.338	60	66.5	64	63	74	67	68.0	77	50	.478	.550	.556	.525
11	29.157	29.080	29.265	29.167	66	72	61	68	76	65	69.7	80	63	.612	.731	.483	.609
12	29.425	29.514	29.543	29.497	59	60	56.5	63.5	69.5	61.5	65.0	71.6	59.2	.440	.391	.391	.407
13	29.582	29.465	29.360	29.469	55.5	63.5	63	58.5	70	67	65.0	74	52.6	.375	.499	.522	.465
14	29.247	29.210	29.330	29.262	61.5	66	52	64	70	57.5	64.0	72	55.5	.512	.586	.315	.471
15	29.437	29.471	29.521	29.476	53	55	61.5	57.5	65	66	63.0	67	51	.343	.300	.487	.377
16	29.657	29.671	29.624	29.651	54	55	56	60	65.5	60.5	62.0	72	52.5	.338	.307	.403	.349
17	29.532	29.481	29.444	29.492	57	61	62	62	66	65.5	64.5	70	58	.399	.470	.509	.459
18	29.492	29.483	29.458	29.478	60	64.5	59	64	71	63	66.0	72.5	57	.465	.519	.447	.477
19	29.406	29.335	29.333	29.358	59	67	63	62	74.5	66	67.0	75.5	58	.460	.561	.536	.519
20	29.411	29.448	29.451	29.437	59	64	60	63	69	63	65.0	71.5	60	.447	.529	.478	.485
21	29.459	29.378	29.231	29.356	61.5	66.5	64	63	72	66	67.0	72.2	58	.527	.576	.569	.557
22	29.045	29.100	29.203	29.116	64	65	61	65.5	72	65.5	68.0	74	63	.576	.524	.483	.528
23	29.306	29.515	29.665	29.495	60	55	52	64	65	55.5	61.5	67.4	54.5	.465	.300	.342	.369
24	29.690	29.613	29.519	29.607	55	59.5	61	60	68	63.5	64.0	72.4	52.5	.367	.396	.503	.422
25	29.409	29.333	29.344	29.362	59.5	67	65	63	71	68	64.3	72.6	59.5	.462	.608	.577	.549
26	29.271	29.214	29.231	29.239	64	69	64.5	66	75	66.5	69.0	77	63.8	.569	.628	.579	.592
27	29.164	29.203	29.219	29.195	64	65	62.5	65.5	70	65	67.0	72.6	63	.576	.550	.532	.553
28	29.234	29.172	29.256	29.221	59	67.5	62	61.5	76	67	68.0	82	59	.467	.560	.489	.505
29	29.414	29.493	29.565	29.491	59	57	51	63	65	57	62.0	68	55	.447	.359	.295	.367
30	29.623	29.531	29.446	29.533	53	61	60	55	69	64	62.6	72	49.5	.376	.430	.465	.424
31	29.329	29.121	28.947	29.132	59.5	61	63	63	63	64.5	63.5	66.2	61.4	.462	.510	.556	.509
Means....	29.369	29.347	29.349	29.355	63.0	64.6	61.0	63.3	71.3	64.7	66.3	....	....	.479	.518	.508	.501
Sept. 1	28.872	29.038	29.243	29.050	59.0	48	45.0	61.6	49.8	49	53.4	66	46	.466	.309	.247	.341
2	29.403	29.417	29.385	29.402	41.0	48.2	45.4	44.5	54.5	48.5	49.2	56	41.5	.211	.249	.265	.242
3	29.403	29.303	29.269	29.325	50	59.6	60.2	54	66	64	61.3	69	47.2	.308	.422	.465	.398
4	29.266	29.247	29.318	29.277	61.8	67.3	65.4	65	76.2	69.4	70.2	77.5	62.4	.507	.553	.564	.541
5	29.324	29.261	29.320	29.302	63.5	64.8	55.2	65	66	56	62.3	70.2	55	.566	.604	.420	.530
6	29.378	29.332	29.250	29.320	53.8	55	57.2	54.2	56.4	58.2	56.2	59.5	54	.409	.413	.432	.425
7	29.152	29.178	29.148	29.159	61	68.5	61	62	72.5	63.8	66.1	73	56	.523	.643	.497	.554
8	29.161	29.324	29.485	29.323	57	54	52.5	60	60	56.8	59.0	65	55	.426	.338	.336	.367
9	29.625	29.588	29.557	29.590	49.5	59	58	52.5	66.2	60.2	59.6	68.2	50	.315	.407	.456	.393
10	29.570	29.526	29.464	29.520	56.5	63.5	60	59	69.2	62	63.4	70.8	57	.424	.512	.491	.476
11	29.372	29.321	29.135	29.276	60	65	63	62	69	65	65.3	67	60	.491	.564	.549	.535
12	29.371	29.617	29.721	29.569	44.5	45.5	45	47	52.5	51	50.2	67	44.8	.260	.212	.220	.231
13	29.796	29.727	29.680	29.734	43	47	49	47	52.8	52.8	50.9	54	44.5	.225	.244	.295	.255
14	29.623	29.554	29.530	29.569	50.5	57	57	54	63.5	59.4	59.0	66	51	.321	.379	.432	.377
15	29.496	29.558	29.640	29.565	58	55.5	53	60	58	55	57.66	62.8	52.6	.456	.408	.376	.413
16	29.648	29.571	29.467	29.562	49	54	54.5	51	60.8	56.4	56.06	62	49.4	.321	.325	.398	.348
17	29.347	29.183	29.035	29.192	58.5	61	60	60.2	61.6	61	60.90	63	53.5	.470	.530	.505	.502
18	29.002	29.220	29.410	29.211	59.5	57.5	52.5	60.2	58.8	54	57.66	64	52	.497	.454	.375	.442
19	29.546	29.577	29.565	29.563	47.5	53.5	49.5	49	58	52	53	59.6	46	.309	.350	.321	.327
20	29.393	29.426	29.517	29.445	54.5	59	52.5	56	65.6	55	58.83	69	50	.405	.413	.362	.393
21	29.567	29.494	29.394	29.485	53.5	60	59	56.8	64	61.5	60.80	70	50	.370	.465	.467	.434
22	29.404	29.385	29.407	29.399	58.5	63.5	57.5	62	69.8	61	64.26	73	58.5	.444	.499	.427	.457
23	29.314	29.198	29.301	29.271	59	62.5	50	61.2	68.5	51.5	60.4	72.5	49.5	.473	.486	.341	.433
24	29.461	29.474	29.430	29.455	46	52.5	51	47.2	57.6	54.5	53.1	62	44.8	.297	.329	.328	.318
25	29.414	29.296	29.317	29.342	52	58.5	54.5	54.8	67	58.2	60.0	68.5	53.0	.355	.378	.378	.370
26	29.370	29.338	29.362	29.357	52	59	55.5	55.2	65	58.8	59.66	69.4	53.5	.349	.420	.395	.388
27	29.390	29.305	29.260	29.318	53	62	56.5	55.2	67	59	60.33	68.2	53.5	.376	.489	.424	.430
28	29.231	29.208	29.302	29.247	56.5	63.5	53.5	59.2	64.6	55	59.6	67	53.4	.417	.572	.390	.460
29	29.308	29.442	29.463	29.404	51	53	48	52	57	50.5	53.2	58.6	48.5	.361	.350	.302	.338
30	29.533	29.532	29.506	29.524	48	50.5	48	50	55	50.5	51.8	56.4	48.2	.309	.307	.302	.306
Means....	29.392	29.388	29.396	29.392	53.5	57.5	54.3	55.9	62.4	57.0	58.44	....	....	.389	.421	.393	.401

of the north and northwestern lakes, at Thunder Bay island, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1. 000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.867	.628	.723	.739	SW	SE	N	4.0	7.0	15.6	2.7	N. 15 E.	1	8	10	.275	....
.680	.582	.833	.698	N	E	Calm	14.0	5.0	0.0	5.0	N. 20 E.	0	0	0	.252	0.04
.816	.698	.819	.781	S	S. SE	SE	10.2	25.4	12.0	15.0	S. 23 E.	8	9	7	.140	....
.871	.661	.799	.777	S	S	SW	9.0	8.0	10.0	8.3	S. 17 W.	1	1	10	.198	....
.838	.613	.805	.752	NW	N	N	11.0	22.5	7.4	12.8	N. 12 W.	10	1	0	.243	....
.745	.572	.778	.698	NW	S. SE	S	6.8	7.0	16.0	6.0	S. 7 W.	0	10	10	......	0.46
.884	.787	.854	.842	S	S	N	12.2	22.0	34.5	0.1	North	10	10	10	......	0.92
.921	.815	.801	.846	Calm	SW	N	0.0	16.5	22.4	5.3	N. 47 W.	10	1	10	......	1.04
.888	.751	.862	.834	NW	NW	N	14.6	13.6	4.0	10.3	N. 40 W.	10	5	0	......	....
.831	.655	.841	.776	NW	S. SE	S. SE	4.2	8.0	8.0	4.1	S. 16 E.	1	2	4	.222	0.04
.895	.815	.783	.831	S	SW	N	19.0	8.4	4.0	7.2	S. 16 W.	10	3	1	.120	....
.751	.543	.716	.670	W.NW	N	N	11.2	17.5	8.0	10.5	N. 19 W.	0	1	0	.228	....
.710	.680	.790	.727	NW	S	W	5.0	16.0	8.2	5.7	S. 43 W.	0	5	10	.167	....
.861	.799	.666	.775	W. SW	NW	NW	10.6	12.0	30.6	15.8	N. 56 W.	10	8	0	.209	....
.725	.487	.761	.658	NW	NW	NW	16.0	26.5	20.0	20.8	N. 45 W.	0	1	0	.240	....
.653	.507	.791	.650	N. NE	SE	SE	11.0	8.5	14.8	7.2	S. 73 E.	1	0	2	.248	....
.718	.735	.811	.755	SW	S	S	26.0	21.3	16.8	19.7	S. 18 W.	6	10	5	.170	....
.780	.686	.776	.747	N	N	W	13.6	10.4	2.0	8.0	N. 5 W.	1	0	0	.174	....
.828	.657	.838	.774	SW	S	S	5.8	10.4	6.0	7.0	S. 11 W.	6	1	2	.445	0.26
.776	.747	.831	.785	W	SE	SE	2.0	8.0	3.0	3.2	S. 36 E.	10	4	5	......	....
.914	.735	.891	.847	E	SE	SE	2.6	8.0	8.5	6.2	S. 51 E.	10	10	10	.414	0.46
.917	.668	.783	.789	W	NW	W.NW	3.0	17.0	13.6	10.7	N. 58 W.	3	3	0	.322	....
.780	.487	.776	.681	NW	N. NW	E	15.0	20.5	6.0	10.7	N. 23 W.	2	0	0	.289	....
.708	.578	.859	.715	S. SE	S. SE	S	14.0	24.4	18.0	18.3	S. 15 E.	3	3	0	.208	....
.804	.802	.843	.816	SW	SW	Calm	15.0	8.5	0.0	7.8	S. 45 W.	10	10	10	.162	0.14
.891	.724	.892	.836	SW	S	Calm	4.0	5.0	0.0	2.7	S. 20 W.	10	8	10	......	0.76
.917	.751	.863	.844	S	NE	N	8.6	8.2	4.2	2.0	N. 76 E.	0	10	1	.166	....
.855	.626	.740	.740	NW	E. NE	NW	7.0	8.0	24.0	9.7	N. 29 W.	1	2	0	.225	....
.776	.582	.634	.664	N	N	N. NW	10.0	16.5	15.0	13.7	N. 8 W.	3	1	0	.266	....
.869	.607	.780	.752	W	S	S	7.2	18.0	18.2	12.3	S. 11 W.	1	0	0	.177	1.37
.804	.886	.916	.869	S	S	S	8.0	22.0	6.0	12.0	South	10	10	10	......	....
.818	.673	.802	.763	....	....	....	....	....	....	2.0	S. 75 W.	4.8	4.4	4.1	5.562	5.19
.850	.856	.710	.808	NW	N. NW	N	16.4	32.6	33.0	26.1	N. 18 W.	9	10	10	.240	....
.720	.587	.779	.695	N	NE	SE	13.0	8.0	2.0	6.3	N. 22 E.	8	0	0	.105	....
.738	.660	.780	.726	W. SW	S	S	9.0	16.8	21.0	14.0	S. 11 W.	1	3	0	.255	....
.821	.605	.796	.741	SW	SW	W	10.6	16.4	12.0	12.3	S. 59 W.	0	5	10	.151	....
.916	.945	.935	.932	S	S	E	7.0	5.5	24.0	9.0	S. 63 E.	10	10	10	......	0.54
.973	.904	.937	.938	NE	E	E. SE	22.0	15.4	16.0	15.6	N. 78 E.	10	10	10	......	2.78
.942	.805	.833	.860	W.NW	SW	SE	11.0	2.0	10.0	2.1	S. 46 W.	3	8	0	.212	0.36
.822	.653	.722	.732	W	NW	N. NW	16.8	22.0	4.2	13.0	N. 60 W.	0	10	0	.111	....
.796	.636	.880	.771	NW	S	S	4.0	11.0	12.0	6.8	S. 8 W.	1	0	0	.167	....
.849	.724	.884	.819	S	S	SE	11.5	12.2	3.4	8.8	S. 5 E.	0	0	0	.099	....
.884	.796	.890	.857	S	S	S	11.0	18.2	25.4	18.2	South	10	5	10	.225	0.18
.809	.539	.590	.646	W.NW	NW	N	24.2	33.8	24.0	24.3	N. 39 W.	2	2	8	.141	0.14
.694	.606	.733	.679	E	E	SE	21.4	19.5	14.6	17.3	S. 78 E.	10	10	10	.222	....
.769	.647	.850	.755	W. SW	S	S. SE	7.5	14.8	9.0	8.7	S. 8 W.	8	2	0	.028	....
.880	.845	.869	.865	NW	NW	N	8.0	16.0	6.2	9.5	N. 37 W.	10	10	10	.063	0.15
.859	.606	.873	.779	E	SE	SE	9.4	8.0	14.0	10.0	S. 59 E.	10	10	10	.087	....
.910	.970	.941	.940	S. SE	S	SE	21.0	20.0	1.0	13.7	S. 12 E.	10	10	10	......	....
.970	.908	.900	.926	SW	NW	N. NW	5.0	8.0	12.2	6.4	N. 46 W.	10	10	1	.100	2.17
.889	.727	.827	.814	NW	N	SE	8.0	9.0	7.5	3.1	N. 2 W.	0	1	1	.132	0.16
.903	.658	.837	.799	S	N. NW	N	14.4	10.6	2.0	1.6	S. 57 W.	8	2	2	.092	....
.810	.780	.855	.815	SE	SE	SE	9.5	14.4	17.2	13.7	S. 45 E.	1	10	1	.208	....
.800	.680	.796	.759	S. SW	S	Calm	21.0	7.5	0.0	9.3	S. 17 W.	8	8	2	.188	....
.882	.698	.895	.825	S	S	N	14.0	13.4	25.8	0.5	South	8	2	10	......	....
.923	.695	.772	.797	NW	NW	W	10.4	5.0	10.6	8.0	N. 64 W.	1	4	0	.184	0.86
.836	.571	.786	.731	SW	W. SW	SW	19.0	18.5	16.2	17.5	S. 53 W.	0	8	3	.208	....
.805	.680	.790	.755	SW	S	S	14.2	13.4	12.6	12.7	S. 16 W.	1	0	0	.194	....
.869	.740	.848	.819	S	S	S	9.4	17.0	6.0	10.8	South	0	4	1	.192	....
.890	.943	.902	.888	S	S	N	13.0	6.6	14.5	1.7	South	10	10	1	......	....
.930	.752	.822	.835	NW	NE	E. SE	7.0	12.0	2.0	4.6	N. 23 E.	10	4	2	.132	1.08
.856	.712	.822	.797	S. SE	E	E. SE	13.2	9.5	22.0	14.8	S. 73 E.	10	10	10	.076	0.16
.851	.727	.828	.803	....	....	....	....	....	....	2.2	S. 9 W.	5.6	5.9	4.4	3.812	8.58

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
October 1	29.444	29.415	29.342	29.399	52	54	57	53.5	56	58	55.8	60	48.2	.368	.391	.452	.404
2	29.281	29.346	29.435	29.354	58	64	52	59	68	54	60.3	69.5	52.5	.469	.543	.362	.458
3	29.423	29.292	29.118	29.277	53	59	60	54.5	61	61	58.8	62.5	48.5	.383	.473	.505	.454
4	28.933	29.115	29.524	29.191	61	54.5	44.5	62.5	61	48	57.2	65.5	46.2	.517	.339	.247	.368
5	29.749	29.716	29.617	29.694	39.5	52.5	49.5	41.5	58.5	52	50.6	62	39.5	.217	.316	.321	.285
6	29.333	29.024	28.989	29.115	52	52	55.5	54	53	56	54.3	58	50.2	.362	.375	.434	.390
7	29.064	29.006	28.920	28.997	53	58	59.5	54.5	58.5	60.5	57.8	62.5	52.5	.383	.476	.496	.452
8	28.948	28.880	29.149	28.992	59	60	53	60	63.5	55.5	59.6	66.6	52.5	.487	.471	.370	.443
9	29.444	29.527	29.576	29.519	44	51	47	46	56	49.5	50.4	58	44	.262	.308	.290	.287
10	29.507	29.452	29.448	29.469	47	49.5	45.5	49	52.5	48	49.8	50.4	45.6	.297	.314	.271	.294
11	29.563	29.581	29.540	29.561	41	43	38	43	48	40.5	43.8	50.2	38.8	.231	.312	.210	.218
12	29.505	29.404	29.333	29.414	42.5	48	47.5	45.5	52.5	50	49.1	54	35.2	.233	.276	.296	.268
13	29.293	29.277	29.321	29.297	44	55	49	47	59.5	52	52.8	61.5	44	.249	.373	.308	.310
14	29.457	29.561	29.626	29.545	39	39.5	37.5	41.5	44.5	41	42.3	53.5	39	.206	.178	.179	.188
15	29.550	29.546	29.374	29.490	35	40.5	43.5	39	45	46	43.3	50	37	.152	.194	.250	.199
16	29.110	29.040	29.213	29.121	43	49	41	45	51.5	43	46.5	54	40	.251	.315	.231	.266
17	29.372	29.488	29.534	29.465	39	43	42.5	41.5	46.5	45.5	44.5	48.2	39.4	.206	[illegible]	.233	.224
18	29.454	29.290	29.156	29.300	43	49.5	48.5	46	54.5	51.5	50.6	58.5	42.8	.238	.288	.302	.276
19	29.224	29.362	29.545	29.377	40	38.5	34.5	42.5	42	37	40.5	49	35	.215	.188	.167	.190
20	29.503	29.209	28.932	29.218	31	39	45	34	42.5	48	41.5	50	30.4	.139	.192	.260	.197
21	28.782	28.771	28.847	28.800	45.5	52.5	39	47.5	57.5	41.5	48.8	61	39.6	.278	.329	.206	.271
22	29.033	29.172	29.353	29.186	37	38	34.5	39	42	37	39.3	44.2	33	.194	.177	.167	.179
23	29.600	29.617	29.468	29.562	32	40.5	41.5	35	46	44	41.6	48	32.5	.142	.181	.229	.184
24	29.226	29.246	29.518	29.330	42.5	41	33	45	44.5	36	41.8	48.4	34	.239	.211	.149	.199
25	29.756	29.852	29.853	29.820	27.5	27	27	30	30	30	30	38	27.8	.121	.113	.113	.116
26	29.728	29.502	29.415	29.548	23	32.5	30.5	26	37.5	34	32.5	38	23.5	.089	.119	.130	.112
27	29.293	29.256	29.292	29.280	29.5	36	35.5	32	40.5	39	37.2	46.6	29.8	.134	.153	.162	.149
28	29.322	29.226	29.219	29.256	36	42	41.5	28.5	45	44	42.5	47.6	36	.179	.228	.229	.212
29	29.324	29.4[illegible]6	29.540	29.430	39	42.5	35	40	46.5	38	41.5	50	37	.225	.220	.165	.203
30	29.261	29.116	29.251	29.209	44.5	51	45	47	55.5	47.5	50	57.2	38.6	.260	.315	.266	.280
31	29.141	29.023	29.288	29.151	46	56	45	48	60	48	52	61.5	45	.284	.396	.260	.313
Means....	29.342	29.314	29.346	29.334	42.5	47	43.8	44.7	50.9	46.3	47.4	....	....	.258	.290	.267	.271
Nov. 1	29.359	29.227	29.267	29.284	42	42.5	40	43.5	43.5	41	42.6	49.5	39.2	.247	.259	.235	.247
2	29.275	29.133	29.113	29.173	34.5	35.5	33.5	36	39	35	36.6	42.8	33.2	.167	.162	.173	.167
3	29.198	29.435	29.548	29.394	34	32	30	36.5	36	33	35.1	39.2	30.4	.163	.129	.132	.141
4	29.470	29.308	29.266	29.348	37	43	43	40	47	45.5	44.2	(*)	30.0	.181	.195	.245	.207
5	29.250	29.288	29.522	29.384	38	32.5	29	29.5	35	31	35.2	....	29.4	.210	.153	.137	.163
6	29.478	29.358	29.407	29.414	22.5	30	32	25	33.5	34	30.8	....	22.0	.092	.127	.155	.125
7	29.566	29.619	29.603	29.596	28.5	28	28	31	31.5	31.5	31.3	....	28.0	.128	.113	.113	.118
8	29.524	29.479	29.503	29.502	28	35	31.5	30	39.5	35	35	...	27.4	.130	.145	.137	.137
9	29.543	29.538	29.582	29.554	29.5	39	35.5	32	44	39	38.3	....	29.0	.134	.173	.162	.156
10	29.581	29.557	29.517	29.552	33	35	37.5	36	39	40	38.3	....	33.6	.149	.152	.192	.164
11	29.104	28.945	29.143	29.064	41.5	43	33.4	43.5	46	35.5	41.6	....	33.0	.236	.238	.166	.213
12	39.433	29.392	29.385	29.403	29.5	33.5	32	31.5	37.5	35	34.7	....	29.4	.140	.139	.142	.140
13	29.485	29.489	29.493	29.489	31	32	32.5	34	35.5	34.5	34.6	....	30.6	.135	.136	.158	.143
14	29.523	29.676	29.972	29.724	29	26	21.5	31	29	24	28	....	21.4	.137	.106	.086	.109
15	30.129	30.124	30.081	30.111	22.5	25.5	28	25	28.5	30.5	28	....	20.0	.092	.103	.136	.110
16	29.928	29.752	29.660	29.780	32.5	36	38	35	39	39	37.8	....	28.2	.153	.173	.210	.179
17	29.625	29.680	29.782	29.696	36	39.5	36	37	42	38	39	....	36.4	.199	.209	.186	.198
18	29.710	29.544	29.417	29.557	38	38.5	39.5	40	41.5	41	40.8	....	36.0	.203	.194	.224	.207
19	29.310	29.239	29.185	29.245	39	39	35.5	40	42	38	40	....	35.8	.225	.199	.175	.199
20	29.105	29.214	29.306	29.208	33	29	27	35	32	30	32.3	....	27.5	.162	.126	.113	.134
21	29.274	29.153	29.158	29.195	22	35.5	34	24	40.5	37	33.8	....	21.4	.095	.143	.157	.132
22	29.273	29.335	29.504	29.370	32	30	25	34	33	27	31.3	....	24.4	.155	.132	.112	.133
23	29.555	29.506	29.401	29.487	22.5	27	29	24.5	29.5	31	28.3	....	21.0	.097	.118	.137	.117
24	29.228	29.095	29.093	29.138	30	36	36.5	33	39	39	37	....	29.2	.132	.173	.185	.163
25	29.108	29.159	29.251	29.173	34	34.5	30	36.5	36.5	32	35	....	30.0	.163	.174	.144	.160
26	29.266	29.241	29.231	29.246	25	29	29	28	31	31	30	....	25.6	.100	.137	.137	.125
27	29.111	28.996	28.918	29.008	29	30	27	32	32.5	29	31.1	....	27.4	.126	.138	.124	.129
28	28.813	28.826	28.956	28.865	25	31	28	27	34	30.5	30.5	....	25.0	.112	.139	.136	.129
29	29.041	29.076	29.186	29.101	28	30.5	28.5	30.5	33.5	31	31.6	....	25.6	.125	.135	.128	.129
30	29.230	29.220	29.246	29.232	30	32	32	32.5	34.5	34	33.7	....	29.0	.138	.149	.155	.147
Means....	29.386	29.356	29.390	29.376	31.1	34.0	32.1	33.4	36.8	34.4	34.9	....	....	.151	.155	.156	.154

* **Maximum thermometer accidentally broke.**

of the north and northwestern lakes, at Thunder Bay island, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0=clear sky,) (10=sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.899	.872	.937	.902	E. SE	E. SE	SE	14.0	10.0	16.0	13.0	S. 59 E	10	10	10	......	0.73
.939	.793	.867	.866	S	N	Calm	5.2	2.4	0.0	0.9	South	10	8	0	......	....
.901	.882	.941	.908	SE	SE,	S.SE	4.0	6.4	11.5	7.2	S. 32 E	8	10	5	.105	0.06
.913	.632	.740	.762	S	W.NW	NW	17.6	39.0	27.4	19.3	N. 73 W	10	3	10	.130	....
.826	.644	.827	.766	NW	SE	S	5.4	6.4	13.0	5.1	S. 8 E	3	1	0	.136	....
.867	.932	.967	.922	S	S	S	19.6	31.0	9.2	19.9	South	10	10	10	......	1.34
.901	.969	.940	.937	Calm	Calm	S	0.0	0.0	9.8	3.3	South	10	10	0	......	0.32
.940	.805	.839	.861	S	W.NW	NW	11.6	17.4	11.0	8.7	S. 67 W	10	9	10	......	0.4[illegible]
.843	.687	.819	.783	NW	N	Calm	7.0	6.6	0.0	4.2	N. 23 W	8	8	10	.120	0.22
.853	.796	.813	.821	SE	SW	NW	4.4	8.4	40.0	3.4	S. 79 W	10	10	10	.194	....
.833	.631	.863	.775	N	N.NW.	Calm	26.4	16.4	0.0	14.0	N. 9 W	9	1	0	.121	....
.764	.696	.820	.760	SW	SW	S	10.8	17.0	13.5	12.8	S. 30 W	1	0	1	.171	....
.772	.734	,794	.766	W. SW.	S.SE	N	8.4	8.0	7.6	1.8	S. 57 W	1	8	10	.110	....
.784	.602	.695	.693	N.NW.	N	NE	15.8	19.2	13.4	14.5	N. 4 E	10	10	10	.130	....
.636	.645	.805	.695	E	E. SE	S	12.0	9.5	19.0	0.2	S. 42 E	10	10	10	.398	0.32
.840	.826	.833	.833	SW	W	NW	23.0	2.5	17.5	10.3	S. 82 W	10	10	1	......	....
.784	.732	.764	.760	NW	W.NW	W.SW	11.4	8.4	6.0	7.7	N. 68 W	10	10	8	.126	....
.767	.677	.792	.745	SW	S	SW	23.2	28.8	9.4	19.0	S. 24 W	2	8	8	.276	0.14
.789	.702	.759	.750	W	N	N	10.6	28.5	21.0	16.8	N. 12 W	1	10	3	.288	....
.712	.706	.777	.712	W	S	S	7.0	21.6	23.6	15.3	S. 9 W	10	10	10	.166	....
.848	.695	.784	.776	SW	W.NW	NW	19.0	11.5	14.0	11.3	N. 88 W	2	8	1	......	0.42
.816	.661	.759	.746	N. NW.	NW	NW	22.8	16.5	24.8	21.0	N. 37 W	10	10	7	.138	....
.698	.580	.796	.691	W.NW.	SE	S	13.0	3.0	14.8	5.5	S. 40 W	10	8	10	.117	....
.800	.720	.705	.742	S	NW	NW	17.0	14.0	19.0	8.0	N. 75 W	10	10	10	.115	0.07
.720	.675	.675	.690	N	N	N	28.4	20.8	13.0	20.7	North	10	10	10	......	....
.634	.532	.664	.610	NW	SW	S. SW	4.5	9.0	10.0	6.0	S. 47 W	3	10	0	.152	....
.744	.605	.681	.676	W.NW.	W.NW	W	11.0	4.5	7.4	7.5	N. 75 W	3	10	10	.082	....
.768	.762	.796	.775	SW	SE	S	6.6	20.0	10.2	10.0	S. 18 E	10	10	10	.130	....
.910	.695	.719	.775	W.NW.	W.NW	Calm	8.0	9.0	0.0	5.7	N. 68 W	10	6	2	.122	....
.809	.714	.811	.778	S	S	Calm	12.6	10.2	0.0	7.6	South	10	4	1	.088	....
.850	.765	.777	.797	S	SW	N	6.0	8.0	12.4	1.9	N. 83 W	10	0	0	......	....
.812	.722	.799	.777	....	....	....	....	....	....	3.3	S. 76 W	7.7	7.8	6.0	3.415	4.05
.875	.917	.912	.901	E	E	E	15.2	20.4	14.0	16.5	East	10	10	10	......	0.04
.759	.681	.847	.762	NW	NW	NW	7.5	8.4	15.5	10.5	N. 45 W	10	10	10	......	....
.756	.610	.703	.690	W.NW.	NW	N	15.4	25.6	3.0	14.0	N. 50 W	10	10	8	......	....
.732	.677	.803	.737	S	S	S	16.0	23.4	20.5	19.9	South	6	2	10	......	0.08
.863	.747	.788	.799	N. NW.	N.NW.	N.NW.	9.2	22.0	20.0	17.1	N. 23 W	10	10	10	......	....
.684	.659	.792	.712	NW	S	E	9.8	6.0	17.2	3.4	N. 85 E	8	10	10	......	....
.737	.639	.639	.672	E	E	NE	18.0	11.4	10.6	12.5	N. 78 E	3	8	0	......	....
.782	.595	.674	.683	N. NE.	N	NW	9.5	12.0	4.0	7.8	N. 2 E	1	8	10	......	....
.744	.597	.681	.674	W.NW.	NW	NW	4.0	10.4	9.0	7.7	N. 49 W	2	2	10	......	....
.705	.636	.776	.706	W.NW.	N	SE	11.0	3.4	14.0	7.8	S. 8 W	10	10	10	......	....
.834	.767	.799	.800	S	S. SW.	NW	29.8	15.2	16.8	12.3	S. 28 W	10	10	10	......	....
.791	.624	.608	.704	W.NW.	W	W	10.0	6.4	22.6	12.7	N. 85 W	10	10	10	......	....
.695	.653	.794	.714	W.NW.	N	N	9.0	4.5	3.4	4.7	N. 36 W	10	8	10	......	0.06
.788	.665	.675	.709	NW	NW	NW	7.0	21.4	18.0	15.5	N. 45 W	10	8	10	......	....
.684	.660	.834	.726	E	E. SE	SE	8.0	11.5	15.0	11.0	S. 63 E	10	10	2	......	....
.747	.726	.863	.779	S.SE	S.SE	SW	16.0	10.8	6.0	9.8	S. 12 E	10	10	10	......	0.68
.903	.786	.811	.833	NW	NW	NE	4.0	9.6	6.6	5.0	N. 20 W	10	9	10	......	....
.820	.741	.868	.809	S	S. SW.	S. SW.	9.2	8.0	6.0	7.5	S. 14 W	10	10	10	......	....
.910	.744	.765	.806	W.NW.	NW	N. NE.	5.0	8.2	12.4	6.7	N. 14 W	10	10	10	......	0.09
.797	.694	.675	.722	NE	NE	NE	24.6	20.5	11.4	18.8	N. 45 E	10	3	2	......	....
.738	.562	.712	.671	W.NW.	SW	SW	5.0	4.0	5.0	3.9	S. 68 W	2	1	10	......	....
.792	.703	.761	.752	N. NE.	N. NE.	N	14.0	25.2	30.0	22.7	N. 13 E	10	10	10	......	0.09
.742	.725	.788	.752	N. NW.	W.NW	S. SW.	27.5	8.0	8.6	9.9	N. 46 W	10	10	5	......	....
.703	.726	.770	.733	SW	S	S	11.6	24.6	17.6	16.8	S. 9 W	8	10	10	......	0.10
.756	.804	.794	.785	W	W	N	6.4	7.0	8.0	5.2	N. 59 W	10	10	10	......	....
.655	.788	.788	.744	NW	W.NW	W	10.8	8.4	4.2	7.4	N. 61 W	10	8	10	......	....
.694	.748	.775	.739	SW	SW	NW	8.0	9.8	5.6	6.2	S. 62 W	10	10	10	......	0.05
.761	.712	.834	.769	W	W.NW	W.NW	1.0	5.4	1.5	2.6	N. 71 W	10	10	8	......	....
.733	.707	.736	.725	NW	N.NW.	N	4.4	7.0	2.0	4.3	N. 26 W	10	10	10	......	....
.748	.744	.792	.761	S	Calm	NE	3.0	0.0	7.4	1.9	N. 67 E	10	10	5	......	0.20
.764	.701	.711	.745	....	....	....	....	....	....	2.2	N. 35 W	8.66	8.5	8.66	......	1.39

L.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Means.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.383	29.456	29.612	29.484	31	28.5	22.5	32.5	31	24.5	29.3	....	21.5	.157	.128	.097	.127
2	29.640	29.583	29.432	29.552	19.5	26	27	22	29	29	26.6	....	19.0	.077	.106	.124	.102
3	29.246	29.196	29.311	29.251	24.5	28	27	27	31	29	29	....	24.6	.103	.119	.124	.115
4	29.277	29.211	29.208	29.232	24	25	23	26	28	25.5	26.5	....	23.4	.106	.100	.095	.100
5	29.210	29.058	29.098	29.122	19	23.5	17	21.5	26.5	19	22.3	....	16.6	.075	.092	.071	.079
6	29.310	29.372	29.473	29.385	04	07	09	05.5	09	10	08.2	....	03.0	.035	.037	.054	.042
7	29.510	29.507	29.535	29.517	13	18	17	15.5	20.5	19	16	....	08.8	.050	.070	.071	.064
8	29.409	29.374	29.475	29.419	23.5	22	21.5	24.5	24.5	23	22.3	....	16.8	.114	.089	.098	.100
9	29.526	29.452	29.422	29.466	25.5	30	28.5	27	32	30	29.6	....	20.4	.120	.114	.139	.124
10	29.335	29.242	29.149	29.242	30	38	37	31.5	40.5	39	37	....	27.6	.150	.196	.194	.180
11	28.099	29.095	29.336	29.176	37	42	39	39.5	46	41	42	....	36.8	.188	.215	.212	.205
12	29.483	29.462	29.388	29.444	28.5	33	36	30.5	36	38	34.8	....	27.0	.133	.149	.186	.156
13	29.235	29.160	29.152	29.182	38	39	39.5	39.5	40	40.5	40	....	36.5	.210	.225	.230	.222
14	29.280	29.195	29.000	29.158	35.5	39	40	37	40	41.5	39.5	....	34.0	.188	.225	.228	.214
15	29.037	29.037	28.961	29.012	35	33.5	30	37	36	31.5	34.8	....	29.2	.178	.159	.150	.162
16	28.941	29.061	29.313	29.105	27.5	25	17	29.5	27.5	19	25.3	....	17.2	.127	.106	.071	.134
17	29.641	29.848	29.891	29.793	14	16	15	16	18	17.5	17.1	....	12.4	.059	.067	.057	.061
18	29.831	29.260	29.260	29.450	25	31	32	27	35.5	35	22.5	....	16.0	.112	.122	.142	.125
19	29.685	29.809	30.012	29.835	16	12	11	19	14	13	15.3	....	10.6	.056	.052	.049	.052
20	30.067	30.042	29.902	30.004	09.5	21	20.5	11	23.5	22.5	19	....	08.4	.050	.084	.087	.074
21	29.682	29.483	29.467	29.545	21	22.5	25	23	24	26.5	24.5	....	19.6	.090	.104	.118	.104
22	29.376	29.292	29.398	29.355	28	37.5	30.5	30.5	42	33	35.2	....	24.0	.136	.166	.141	.148
23	29.561	29.651	29.641	29.618	29	25	24.5	32	27	26.5	28.5	....	23.5	.126	.112	.109	.116
24	29.357	29.199	29.135	29.230	32	35	38	34	38	40	37.3	....	24.0	.155	.165	.203	.174
25	29.223	29.178	29.191	29.197	32.5	40.5	29	35	44	30.5	36.5	....	28.8	.152	.207	.143	.167
26	29.096	28.980	29.055	29.043	33	34	32.5	34.5	35.5	33.5	34.5	....	27.5	.169	.176	.171	.172
27	29.168	29.149	29.129	29.142	32	34	32	33.5	36	34	34.5	....	31.0	.162	.170	.155	.162
28	29.112	29.027	28.986	29.042	30	30	32	32	33	35	33.3	....	29.2	.144	.141	.142	.142
29	29.228	29.335	29.429	29.331	30.5	31	26.5	33	35	29	32.3	....	26.5	.141	.128	.115	.128
30	29.463	29.439	29.476	29.459	24	24.5	23.5	26.5	28	26	26.8	....	23.6	.100	.092	.097	.096
31	29.594	29.563	29.572	29.576	21	29	29	23.5	32	31.5	29	....	20.8	.084	.126	.131	.113
Means....	29.387	29.349	29.368	29.367	25.6	28.4	26.8	27.6	31.0	38.8	29.1	....	....	.121	.130	.129	.127
1863.																	
Jan. 1	29.553	29.405	29.328	29.429	24.5	30.5	31	29	33.5	33.5	31.3	....	24	.103	.147	.145	.132
2	29.233	29.099	29.089	29.140	34	35	36	35.5	37.5	38	37	....	31.5	.176	.171	.186	.178
3	29.194	29.121	28.951	29.089	36	38	36.5	38	39.5	37.5	38.3	....	36	.186	.210	.203	.266
4	28.595	28.563	28.918	28.692	39.5	34.5	31	40	35	32.5	35.8	....	31	.236	.193	.157	.195
5	28.936	28.940	28.947	28.941	32.5	34	33	33.5	35	33.5	44	....	30.5	.171	.183	.182	.179
6	28.987	29.032	29.215	29.078	29.5	21	17.5	25.5	22.5	19	22.3	....	16	.102	.096	.079	.092
7	29.485	29.534	29.603	29.541	7.5	14.5	14	9.5	17	15.5	14	....	8	.038	.056	.065	.052
8	29.610	29.569	29.614	29.598	17.5	20	19	19.5	23	20.5	21	....	12	.073	.074	.086	.078
9	29.655	29.571	29.413	29.546	18.5	24	30.5	22	26.5	32	26.8	....	16	.061	.100	.153	.105
10	28.944	28.716	28.843	28.834	34	33	29	34.5	34	30	32.8	....	27.5	.189	.175	.149	.168
11	28.997	29.157	29.408	29.187	19	20	19	21	22	21.5	21.5	....	19	.080	.085	.075	.080
12	29.408	29.389	29.574	29.457	23	26.5	27	25	28.5	28.5	27.3	....	19	.100	.120	.130	.117
13	29.645	29.388	29.199	29.411	28.5	30	32	30.5	31.5	33.5	31.8	....	26	.133	.150	.162	.148
14	29.056	28.956	29.072	29.028	32	30	23	34	32	24.5	30.2	....	21.5	.155	.144	.106	.135
15	29.173	29.143	29.167	29.161	17	16	12	19	18.5	14	17.2	....	12.5	.071	.061	.052	.061
16	29.106	29.151	29.342	29.200	5	1.5	2	6	3	3.5	4.2	....	1	.043	.029	.031	.034
17	29.565	29.788	29.903	29.752	0.5	13	15.5	1.5	15.5	18	11.7	....	0	.033	.050	.059	.047
18	29.893	29.831	29.761	29.828	16	24	25.5	18.5	27	28	24.5	....	19	.061	.095	.109	.088
19	29.749	29.742	29.758	29.750	22	31	28	24.5	34	29.5	29.3	....	23	.089	.139	.136	.121
20	29.676	29.553	29.481	29.570	32	32	30	34	34.5	32	33.5	....	27	.155	.149	.151	.152
21	29.488	29.528	29.558	29.525	31	35	31.5	32.5	36	33	33.8	....	29.5	.157	.191	.160	.169
22	29.453	29.343	29.388	29.395	32	33	32	33.5	34.5	33.5	33.8	....	31.5	.162	.169	.162	.164
23	29.425	29.591	29.511	29.509	32.5	29	30.5	34.5	31	32	32.5	....	28	.158	.137	.154	.149
24	29.249	29.231	29.567	29.349	33.5	34	32.5	34.5	35	33.5	34.3	....	29.5	.179	.183	.171	.178
25	29.554	29.517	29.558	29.543	30.5	37	27	32	40	30	34	....	27	.153	.181	.106	.147
26	29.421	29.313	29.322	29.352	26	32	29	28	34	31.5	31.2	....	26	.117	.155	.131	.134
27	29.336	29.372	29.404	29.371	26.5	26	24	29	28.5	24.5	27.3	....	24	.115	.112	.112	.113
28	29.397	29.281	29.206	29.295	18.5	29.5	28	21	31.5	30	27.5	....	18	.072	.140	.130	.047
29	29.026	28.926	28.936	28.963	23	28	28.5	25	29.5	30	28.2	....	28.5	.100	.136	.139	.125
30	29.094	29.210	29.274	29.193	25.5	26	25	26.5	29.5	26.5	26.8	....	22.5	.126	.123	.118	.122
31	29.139	29.209	29.241	29.230	28	26.5	19	29	28.5	21	26.2	....	18	.142	.120	.080	.114
Means....	29.324	29.294	29.340	29.319	24.7	28.2	25.7	25.9	29.8	27.4	27.7	....	....	.056	.099	.125	.093

of the north and northwestern lakes, at Thunder Bay Island, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.848	.736	.742	.775	East	N	NW	16	16.5	14.2	9.0	N. 13 E.	10	10	10	......	....
.652	.665	.775	.697	NW	S.SW	SW	20.6	4.0	9.0	7.7	N. 79 W.	10	10	10	......	....
.703	.685	.775	.721	SW	W	W.NW	14.8	5.4	8.0	8.1	S. 73 W.	10	10	10	......	....
.754	.655	.689	.699	W	W.NW	W.NW	15.8	14.5	11.0	13.5	N. 76 W.	8	10	10	......	....
.647	.629	.692	.659	W.NW.	W	NW	14.8	8.0	32.0	17.5	N. 58 W.	10	10	10	......	....
.633	.568	.791	.664	NW	NW	NW	38.4	37.6	29.8	35.3	N. 45 W.	10	10	10	......	0.33
.568	.635	.692	.632	NW	N	N	17.0	6.5	1.0	7.7	N. 32 W.	10	10	10	......	....
.870	.680	.797	.782	S.SW	S	W	18.0	21.0	14.5	14.3	S. 30 W.	10	10	10	......	0.41
.821	.794	.836	.817	W	W	SW	3.0	6.5	8.4	5.5	S. 70 W.	10	10	5	......	....
.843	.779	.816	.813	S.SW	S	S	10.0	13.0	14.6	12.3	S. 6 W.	2	2	2	......	....
.773	.691	.824	.762	S	S	S.SW	14.4	11.8	4.6	10.1	S. 3 W.	3	7	10	......	....
.785	.705	.811	.767	NW	E	SE	3.2	1.0	12.6	3.4	S. 49 E.	10	10	10	......	0.37
.863	.910	.911	.895	S	S.SE	S.SE	21.4	14.2	7.4	14.0	S. 11 E.	10	10	10	......	....
.854	.910	.869	.877	W	Calm	SE	1.0	0.0	7.6	2.3	S. 39 E.	10	10	10	......	....
.807	.753	.843	.801	NW	W.NW	NW	15	8.4	4.0	9.0	N. 52 W.	3	10	9	......	....
.778	.707	.692	.726	W.NW.	NW	NW	10.5	16.0	18.0	14.7	N. 50 W.	10	10	10	......	....
.659	.682	.597	.646	NW	SW	SW	18.5	15.6	2.0	8.5	N. 89 W.	10	10	2	......	....
.761	.588	.698	.682	S	S	S	28.2	38.4	31.4	32.7	South	6	6	2	......	....
.541	.635	.623	.600	N	N	N.NE	39.0	28.0	14.0	26.7	N. 4 E.	9	8	10	......	....
.696	.669	.725	.696	W	S	S	4.0	5.4	18.0	8.0	S. 10 W.	8	8	3	......	0.06
.730	.803	.818	.784	S	S	SW	35	22.8	11.0	21.7	S. 7 W.	10	10	10	......	....
.834	.619	.752	.735	SW	W.NW	N	3.0	7.6	8.5	4.3	N. 44 W.	3	4	10	......	....
.694	.761	.757	.737	N.NE	NE	SE	7.0	40.0	14.6	7.3	N. 81 E.	10	10	10	......	0.04
.792	.719	.820	.777	S	S	S	30.2	31.4	33.0	31.5	South	10	10	10	......	....
.747	.716	.839	.767	W.SW.	NW	Calm	7.0	2.0	0.0	2.7	S. 81 W.	1	6	4	......	....
.845	.849	.894	.863	E	E. SE	N. NE	7.0	14.0	4.0	7.2	S. 85 E.	8	10	10	......	0.19
.841	.802	.792	.812	NW	SW	SW	2.0	9.4	6.8	5.4	S. 52 W.	10	10	10	......	....
.794	.732	.698	.748	S	S.SE	SW	9.8	10.6	4.0	7.5	S. 3 E.	1	1	10	......	....
.752	.628	.720	.700	NW	NW	N	14.6	10.8	11.0	11.3	N. 32 W.	8	9	10	......	....
.699	.599	.694	.664	N	N	N	15.0	15.2	8.4	12.9	North	10	10	10	......	....
.669	.694	.740	.701	W. NW.	W. SW	S	6.0	8.0	15.0	6.8	S. 39 W.	8	1	8	......	....
.750	.711	.762	.741	....	....	....	....	....	....	3.9	S. 68 W.	8.0	8.4	8.5	......	1.40
.703	.797	.756	.752	S	S	S	25.8	26.2	33.6	28.5	South	2	10	8	......	....
.849	.762	.811	.807	S	S	S	32.0	38.4	28.0	32.8	South	10	8	2	......	....
.811	.863	.904	.859	S. SW	S	S	19.0	15.0	11.5	15.2	S. 9 W.	8	10	10	......	....
.954	.948	.849	.927	S	NW	NW	24.0	24.0	25.5	12.3	S. 72 W.	10	10	6	......	.94
.894	.898	.947	.913	W	W	Calm	7.0	6.0	0.0	4.3	West	8	10	10	......	....
.750	.794	.768	.737	N. NW.	NW	N.NW.	8.0	20.0	37.0	21.2	N. 29 W.	6	10	10	......	.18
.575	.589	.739	.631	N. NW.	N.NW	Calm	41.6	17.5	0.0	19.7	N. 22 W.	6	8	10	......	....
.697	.598	.780	.692	W. SW.	W.SW	Calm	5.5	8.0	0.0	4.5	S. 67 W.	10	10	10	......	....
.516	.699	.845	.687	W	W	S	7.0	2.0	14.0	5.5	S. 23 W.	10	10	10	......	....
.948	.897	.890	.912	S. SE	S	W	29.0	22.8	14.0	16.7	S. 3 W.	10	10	10	......	.31
.712	.721	.647	.693	NW	NW	NW	13.0	18.0	7.8	12.9	S. 45 W.	10	10	10	......	....
.746	.771	.829	.782	S. SW	W	NW	23.0	10.6	19.0	11.2	S. 77 W.	10	10	10	......	....
.785	.843	.841	.823	S. SE	S.SE	S.SE	12.8	20.5	25.6	19.6	S. 22 E.	10	10	10	......	....
.792	.794	.807	.798	SW	SW	SW	12.0	19.0	22.4	18.1	S. 45 W.	10	10	10	......	.15
.692	.610	.645	.646	NW	N.NW	N	14.4	26.0	34.6	23.7	S. 17 W.	10	10	10	......	....
.760	.594	.602	.652	N	N	W	38.2	35.4	28.0	26.2	N. 21 W.	10	10	10	......	....
.717	.568	.603	.629	NW	S	S	7.5	7.0	24.0	8.7	S. 12 W.	10	10	10	......	.36
.610	.644	.711	.655	S	S	S	36.2	40.8	42.4	39.8	South	8	7	3	......	....
.680	.712	.834	.742	SW	S.SE	Calm	12.0	4.0	0.0	4.7	S. 30 W.	6	10	10	......	....
.792	.714	.800	.779	SE	SE	SE	11.0	14.8	18.0	14.6	S. 45 E.	10	10	10	......	....
.848	.900	.850	.866	Calm	SE	SE	0.0	2.0	9.0	3.7	S. 45 E.	10	10	10	......	.22
.841	.845	.841	.842	S	S.SE	SE	12.4	10.0	11.4	10.7	S. 21 E.	10	10	10	......	....
.795	.788	.845	.809	E	N	E	9.2	14.0	20.0	10.7	S. 64 E.	10	10	10	......	....
.896	.898	.894	.896	S. SE	S	S	38.6	22.4	9.5	23.0	S. 12 E.	10	10	10	......	.74
.845	.732	.665	.747	W	NE	Calm	12.2	2.0	0.0	3.7	N. 82 W.	10	10	10	......	....
.768	.792	.740	.767	Calm	NE	NE	0.0	11.0	19.6	10.2	N. 45 E.	10	10	10	......	....
.720	.716	.812	.749	N	N.NW	NW	21.0	16.4	18.0	17.5	N. 21 W.	10	10	10	......	....
.641	.791	.782	.738	W	W	S	9.2	5.0	13.0	6.6	S. 48 W.	8	8	0	......	....
.746	.834	.836	.805	S. SW	Calm	S.SE	9.4	0.0	3.6	4.0	S. 11 W.	3	10	10	......	....
.878	.824	.818	.840	NE	E	SW	9.8	11.0	7.4	4.2	N. 82 E.	10	10	10	......	.47
.887	.771	.712	.790	W	NW	N	18.6	13.5	10.2	11.5	N. 56 W.	4	10	2	......	.13
.776	.746	.787	.770	....	....	....	....	....	....	4.1	S. 34 W.	9.0	9.7	8.8	......	3.50

M.—Reductions of the monthly meteorological register of the survey of

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°			°				
Feb. 1	28.997	28.624	28.863	28.828	30	32	18.5	31.5	33.5	20	28.3	....	18	.150	.162	.083	.132
2	29.270	29.432	29.510	29.404	3.5	6	0.5	5	8.5	2	5.2	....	—1	.034	.029	.027	.027
3	29.606	29.796	29.891	29.764	—6	—1	-3.5	-4.5	1	-2.5	—2	....	-6.5	.016	.019	.027	.021
4	30.010	30.102	30.033	30.015	-0.5	10.5	14.5	1	12	16.5	9.8	....	-3.5	.039	.052	.061	.051
5	29.612	29.455	29.487	29.518	20.5	22	20	21.5	23.5	22	22.3	....	13.5	.098	.101	.085	.095
6	29.345	29.316	29.392	29.351	20	24.5	21.5	22.5	27.5	23.5	24.5	....	18	.079	.098	.092	.090
7	29.363	29.391	29.476	29.417	21	28.5	26	21.5	32	28	27.8	....	21	.084	.116	.117	.106
8	29.760	29.817	29.800	29.792	17.5	18.5	19.5	20	21	21	20.7	....	16.5	.068	.072	.077	.072
9	29.643	29.426	39.106	29.392	22	28	28	23	29.5	29	27.2	....	21	.107	.136	.142	.128
10	29.531	29.679	29.702	29.637	19	24.5	22.5	21	27.5	24.5	24.3	....	18	.080	.098	.097	.092
11	29.595	29.431	29.421	29.482	22.5	31	25.5	24.5	35	29	29.5	....	21.5	.097	.128	.098	.104
12	29.438	29.479	29.581	29.499	15	12	7.5	17	15	9.5	13.8	....	8	.063	.041	.038	.047
13	29.702	29.775	29.648	29.708	4	16	17	6.5	19.5	19	15	....	4	.024	.050	.071	.048
14	29.444	29.008	28.805	29.086	27	31.5	35	28	32	37	32.3	....	16	.136	.172	.178	.162
15	29.076	29.381	29.458	29.305	27	26	21.5	29.5	31.5	25	28.7	....	23	.118	.078	.073	.090
16	29.817	29.796	29.725	29.779	11.5	24.5	21	14	28	23.5	21.8	....	12	.044	.092	.090	.075
17	29.459	29.488	29.436	29.458	23.5	31	29.5	26	35	32	31	....	21	.097	.128	.134	.120
18	29.345	29.227	29.198	29.257	26.5	34	31.5	29	38	33.5	33.5	....	27	.115	.144	.154	.138
19	29.115	29.003	28.958	29.025	31.5	35	30	33	38	32.5	34.5	....	30	.161	.165	.138	.155
20	29.164	29.417	29.606	29.396	19	17.5	13.5	21.5	20	15.5	22.3	...	12.5	.075	.068	.058	.064
21	29.923	29.992	29.906	29.940	4	10	8.5	6	13	10.5	9.8	....	3.5	.030	.034	.041	.035
22	29.818	29.692	29.700	29.737	11	19	16	13.5	22	18.5	18	...	9	.043	.069	.061	.058
23	29.727	29.667	29.564	29.653	19.5	25.5	25.5	22	28.5	28	26.2	....	15	.077	.103	.109	.096
24	29.492	29.477	29.462	29.477	20.5	35	28	22.5	38.5	32	31	....	20.5	.087	.158	.108	.118
25	29.463	29.506	29.437	29.469	28.5	36	28.5	30.5	38.5	32	33.7	....	28.5	.133	.179	.116	.143
26	29.121	28.800	28.971	28.964	31	34	34.5	32.5	35	36	34.5	....	30	.157	.183	.180	.173
27	29.141	29.415	29.581	29.379	22	27	25.5	24	30	28	27.3	....	20	.095	.113	.109	.106
28	29.581	29.420	29.292	29.431	22	31	30	24	34	32	33.3	....	20	.095	.139	.144	.126
Means...	29.487	29.404	29.465	29.472	18.3	23.5	21.3	20.3	26.7	22.7	23.2	....	....	.086	.104	.096	.095
March 1	29.096	29.090	29.191	29.126	30	36.5	30	31	40	32	34.3	....	29	.155	.170	.144	.156
2	29.237	29.266	29.317	29.273	27	26.5	24	28	28	26	27.3	....	23.5	.136	.126	.106	.123
3	29.436	29.495	29.536	29.489	13	16	13	14.5	19	15.5	16.3	....	12	.061	.056	.050	.056
4	29.706	29.783	29.744	29.744	8	14.5	9.5	10.5	17	11	12.8	....	9	.034	.056	.049	.046
5	29.561	29.259	29.019	29.280	14.5	26	27	16.5	28	28.5	24.3	....	10	.061	.117	.130	.103
6	28.991	29.257	29.448	29.232	29.5	26	19.5	31.5	29	21.5	27.3	....	19	.040	.106	.082	.109
7	29.433	29.428	29.313	29.391	18	23.5	19	19.5	26	21	22.2	....	15.5	.081	.097	.080	.086
8	29.116	28.958	28.926	29.000	20.5	29	28	22	32	30	28	....	18	.093	.126	.130	.116
9	29.105	29.240	29.295	29.213	16	22	17	18.5	26	19	21.2	....	15	.061	.072	.071	.068
10	29.328	29.100	29.080	29.169	15	33	30	17.5	38	33	29.5	....	16.5	.057	.123	.132	.104
11	29.383	29.355	29.416	29.385	17.5	17	13	20.5	21.5	15	19	....	13.5	.062	.043	.056	.054
12	29.505	29.537	29.544	29.529	9	14.5	10	11.5	17	12	13.5	....	8	.037	.056	.046	.046
13	29.433	29.522	29.473	29.496	10.5	17	14	13	21	16.5	16.8	....	9	.041	.049	.054	.048
14	29.328	29.298	29.304	29.310	17	32	25.5	19.5	34.5	28	27.3	....	13.5	.066	.149	.109	.108
15	29.332	29.357	29.393	29.361	21	23	21.5	23	25	23.5	23.8	....	19.5	.090	.100	.092	.094
16	29.490	29.501	29.403	29.465	20	30	25	22	34	28.5	28.2	....	21	.085	.121	.095	.100
17	29.238	29.352	29.486	29.359	31	34	28	32.5	37.5	30	33.3	....	26.5	.157	.150	.130	.146
18	29.713	29.771	29.809	29.764	13	17.5	12	16	22	15	17.7	....	11.5	.044	.045	.041	.043
19	29.856	29.855	29.812	29.841	12	30	22.5	14	33.5	25	24.2	....	9.5	.052	.127	.091	.090
20	29.686	29.708	29.686	29.693	24	26.5	27.5	27	31.5	30	29.5	....	22.5	.095	.086	.121	.101
21	29.463	29.375	29.440	29.426	27	32	30	28.5	36	33	32.5	....	25.5	.130	.129	.132	.130
22	29.493	29.487	29.487	29.489	25	33.5	32.5	27	37	34	32.7	....	24.5	.112	.146	.146	.135
23	29.395	29.303	29.237	29.312	33	33	33	34	34	33.5	33.8	....	31	.175	.175	.182	.177
24	28.937	28.850	29.048	28.945	34.5	34.5	32	35	35.5	33	44.5	....	31	.193	.187	.168	.183
25	29.043	29.011	29.106	29.053	30	30.5	24.5	31	31.5	26	29.8	....	24	.155	.158	.115	.143
26	29.219	29.278	29.386	29.294	23	26	23.5	24.5	29.5	26	27.7	....	21	.106	.101	.098	.102
27	29.455	29.370	29.271	29.365	18	30	31	20.5	34	33	29.2	....	13	.070	.121	.151	.114
28	29.090	29.119	29.233	29.144	29	22	14.5	30	25.5	16.5	24	....	13	.149	.078	.061	.096
29	29.342	29.528	29.649	29.506	12.5	27	23	14	29	25	22.7	....	9.5	.059	.124	.100	.094
30	29.630	29.438	29.328	29.465	17.5	32.5	32	20	35.5	34	29.8	....	17	.068	.145	.155	.123
31	29.146	29.157	29.245	29.183	30.5	19	13.5	32.5	20.5	15	22.7	....	12	.141	.086	.063	.097
Means...	29.362	29.325	29.439	29.375	20.8	23.0	22.7	22.7	29.3	24.9	25.6	....	....	.095	.110	.102	.102

the north and northwestern lakes, at Thunder Bay Island, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1,000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a.m.	2 p.m.	9 p.m.	Mean.	7 a.m.	2 p.m.	9 p.m.	7 a.m.	2 p.m.	9 p.m.			7 a.m.	2 p.m.	9 p.m.		
											°					
.843	.841	.776	.820	S. SE ..	SE....	W	16.8	28.0	41.0	12.7	S. 23 W..	10	10	10	......	....
.625	.452	.578	.552	N. NW	N.NW.	NW ...	37.4	38.8	30.0	35.0	N. 29 W..	10	10	10	......	.32
.454	.416	.677	.516	N. NW	N.NW.	N.NW.	26.2	27.8	19.0	24.3	N. 22 W .	10	6	10	......	.16
.852	.706	.664	.741	N. NE..	SE....	SE....	6.0	8.4	30.0	12.2	S. 54 E ..	10	10	10	......	....
.857	.800	.712	.793	SE	W.NW	NW ...	34.6	1.0	6.0	9.2	S. 44 E ..	10	10	10	......	....
.658	.649	.734	.680	N	W	S	9.8	12.0	18.4	5.0	S. 55 W..	10	2	4	......	.54
.669	.644	.768	.694	W. SW.	S	SW ..	22.4	8.0	5.0	10.7	S. 50 W..	8	10	0	......	....
.629	.641	.652	.641	N	N	N	26.4	13.2	17.0	18.9	North ...	10	10	10	......	....
.864	.834	.887	.862	E	SE....	NE ...	33.6	37.0	15.8	24.0	S. 78 E ..	10	10	10	......	.74
.712	.649	.742	.701	NW....	N	Calm..	27.0	4.0	0.0	10.0	N. 40 W .	10	10	10	......	....
.742	.628	.611	.660	S	S	N	9.6	4.0	2.5	3.7	South ...	2	8	10	......	....
.671	.475	.575	.574	NE	N	NW ..	11.6	7.2	14.0	8.5	N. 4 W .	10	10	2	......	....
.412	.475	.692	.526	NW....	NE ...	SE....	6.2	2.0	8.8	1.1	S. 81 E ..	10	3	8	......	.10
.883	.948	.807	.879	SE	S. SE	S.SE..	34.6	41.4	42.0	38.7	S. 29 E ..	10	10	0	......	....
.725	.493	.561	.593	NW....	N.WN.	W.NW	22.5	31.0	38.2	30.0	N. 62 W .	10	2	0	......	.26
.540	.599	.730	.623	NW....	S. SE	S.SE..	27.4	3.0	18.0	3.8	West	4	8	0	......	....
.694	.628	.744	.689	S. SE ..	S	S	24.6	9.0	10.0	14.2	S. 13 E ..	10	2	10	......	....
.720	.628	.803	.719	S. SW..	S. SE .	S.SE..	7.6	16.2	10.0	10.7	S. 13 E ..	3	2	10	......	....
.850	.719	.748	.739	S	N	N	1.0	1.0	7.2	2.4	North ...	10	10	10	......	....
.647	.629	.653	.643	N. NW .	N.NW.	W.NW	33.6	39.0	38.2	36.9	N. 22 W .	10	10	10	......	....
.520	.438	.589	.516	N. NW .	N.NW.	N	24.0	10.5	17.4	17.0	N. 15 W .	8	8	10	......	....
.548	.584	.610	.581	E. SE ..	E	E	27.2	29.5	23.0	26.0	S. 82 E ..	10	10	6	......	....
.632	.660	.711	.674	S	S	SW ...	13.6	12.4	14.0	12.5	S. 15 W..	10	1	1	......	....
.725	.677	.594	.665	W	S	S	9.0	6.6	7.0	5.5	S. 33 W..	4	3	10	......	....
.785	.768	.644	.732	S. SE ..	SE....	SE....	3.5	2.0	1.0	2.1	S. 33 E ..	10	4	10	......	....
.848	.898	.851	.866	E	S.SE..	SW ...	18.8	9.0	18.6	7.7	S. 23 E ..	10	10	10	......	....
.738	.675	.711	.708	NW....	NW...	W	23.2	25.0	18.0	21.0	N. 57 W .	10	2	10	......	....
.738	.712	.794	.748	S. SW..	S.SE..	S.SE..	2.0	19.0	17.5	12.7	S. 21 E ..	1	3	10	......	....
.743	.652	.700	.698	....	....	....	....	....	....	1.1	N. 44 W .	8.5	6.9	7.5	......	2.32
.893	.688	.749	.792	Calm...	S.SE..	NW...	0.0	1.5	15.0	4.6	N. 47 W .	10	10	10	......	....
.883	.826	.754	.821	N	N	NE ...	22.6	17.4	21.0	18.8	N. 15 E ..	10	10	10	......	.06
.730	.541	.568	.613	NE	N.NW.	N.NW.	26.8	18.5	24.5	19.8	N. 2 E ..	10	1	10	......	....
.488	.589	.696	.591	N	N. NE.	NW...	14.2	11.6	6.2	9.7	North ...	6	1	1	......	....
.675	.768	.829	.757	SW	S	S	22.0	33.4	34.8	29.0	S. 10 W..	10	10	10	......	....
.791	.665	.716	.724	NW....	NW...	NW...	18.2	15.6	28.0	18.9	N. 45 W .	10	4	10	......	....
.772	.694	.712	.729	NW....	E	E	5.5	9.0	8.4	4.7	N. 74 E ..	10	8	10	......	....
.790	.694	.782	.755	W. SW.	S	S	10.2	15.0	10.2	10.3	S. 18 W..	4	10	10	......	.05
.610	.515	.692	.606	S	W	W	23.0	26.5	17.0	16.3	S. 62 W..	7	8	2	......	....
.597	.537	.703	.612	S. SW..	SW ...	SW ...	20.8	29.4	27.0	25.3	S. 39 W..	8	10	2	......	....
.563	.372	.648	.528	NW....	NW ...	NW ...	30.0	22.4	25.0	25.8	N. 45 W .	6	7	10	......	....
.505	.589	.610	.568	NW....	NW ..	NW ...	28.0	11.5	22.5	20.7	N. 45 W .	3	10	2	......	.10
.530	.431	.582	.514	NW....	N.NW.	NW ...	16.0	13.4	12.0	13.5	N. 37 W .	8	1	2	......	.07
.623	.744	.711	.693	NW....	NE ...	E	10.6	4.0	2.0	3.5	N. 15 W .	10	10	10	......	....
.730	.746	.734	.737	E. SE ..	E. NE .	E. NE .	14.6	16.4	15.0	14.0	N. 81 E ..	10	10	10	......	.15
.721	.617	.605	.648	NW....	S	SE....	7.4	2.0	7.0	0.6	S. 10 W..	10	1	2	......	....
.848	.669	.782	.766	Calm...	NW...	NE ...	0.0	12.5	17.6	7.2	N. 10 E ..	10	2	1	......	.07
.492	.382	.471	.448	E	E	Calm..	13.0	9.2	0.0	7.4	East	3	0	10	......	....
.635	.659	.684	.659	SE.....	SE....	SE....	1.0	3.0	5.5	3.2	S. 45 E ..	3	0	0	......	....
.644	.488	.729	.620	SE	SE....	E	11.4	17.0	29.0	17.7	S. 68 E ..	8	10	0	......	....
.929	.610	.703	.747	S. SE ..	S	Calm..	27.2	4.4	0.0	10.3	S. 19 E ..	10	5	10	......	....
.761	.665	.665	.697	NE	S.SE..	SE....	2.0	2.0	5.0	2.3	S. 56 E ..	1	10	10	......	.13
.895	.895	.947	.912	E	E	E	31.6	19.4	14.5	21.8	East	10	10	10	......	....
.850	.899	.893	.881	S	NW...	NW ...	2.0	10.8	12.0	7.2	N. 50 W .	10	10	10	......	1.32
.893	.894	.815	.867	N	N	NW...	9.4	12.5	22.0	13.5	N. 22 W .	10	10	6	......	.29
.807	.617	.694	.706	N	N	NW...	20.0	16.5	8.0	14.0	N. 8 W .	10	6	10	......	.14
.635	.617	.800	.684	Calm ..	S	S.SE..	0.0	18.6	17.0	11.7	S. 11 E ..	0	10	10	......	....
.890	.568	.661	.674	W. SW.	NW...	NW...	1.0	28.0	41.0	23.2	N. 46 W .	10	2	10	......	.36
.725	.775	.746	.749	N. NW .	NW...	NW ..	43.6	38.0	34.4	38.0	N. 37 W .	10	1	4	......	.27
.629	.701	.792	.707	W	S	SE....	5.0	14.4	9.0	7.0	S. 4 E ..	7	10	10	......	....
.752	.780	.735	.756	NE	NW...	NW...	11.2	38.0	40.6	26.5	N. 37 W .	10	10	10	......	.22
.711	.659	.718	.696	....	....	....	....	....	....	4.6	N. 36 W. .	7.7	6.6	7.1	......	3.33

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	29.181	28.981	28.667	28.943	10	27.5	31.5	12.5	29.5	34	25.3	....	7.5	.040	.127	.148	.105
2	28.534	28.820	29.053	28.802	33	34.5	29.5	36.5	38	32	35.8	....	29.5	.143	.154	.134	.144
3	29.439	29.633	29.697	29.590	22.5	25	20	25.5	29.5	23	26	....	20	.086	.083	.074	.081
4	29.770	29.693	29.577	29.680	17.5	32	28	20.5	36	30	28.8	....	17	.062	.129	.130	.107
5	29.426	29.286	29.248	29.320	26.5	38	35	29	43	38	36.7	....	26	.115	.164	.165	.148
6	29.331	29.418	29.521	29.423	27	30	29.5	29	32	32	31	....	27.5	.124	.144	.134	.134
7	29.615	29.657	29.707	29.660	21	27.5	23	23.5	33	25.5	27.3	....	20.5	.084	.087	.095	.089
8	29.707	29.684	29.646	29.679	24.5	32	28	27	37.5	31	31.8	....	22	.103	.110	.119	.111
9	29.653	29.522	29.428	29.534	26	34	32	29	38	34.5	33.8	....	27	.136	.144	.149	.143
10	29.285	29.153	29.078	29.172	32.5	35	35.5	34	37	37	36	....	32	.165	.178	.188	.177
11	28.965	29.063	29.115	29.048	40	35	33	42.5	38	35	38.5	....	33.5	.215	.165	.162	.181
12	29.471	29.540	29.537	29.516	26.5	30	25	28	34	28	30	....	24	.126	.121	.100	.116
13	29.583	29.582	29.553	29.573	27.5	36	29	30	41	32	34.3	....	22.5	.121	.147	.126	.131
14	29.571	29.544	29.465	29.527	30.5	37	32	33	42.5	34.5	36.7	....	25.5	.141	.149	.149	.146
15	29.377	29.390	29.358	29.375	36	37	35	38	42.5	37.5	39.3	....	31.5	.186	.149	.171	.169
16	29.465	29.458	29.415	29.446	32	41	35	35	49	39	41	....	30.5	.142	.153	.145	.147
17	29.424	29.353	29.328	29.368	30	40	34	33	46.5	37.5	39	....	30	.132	.163	.150	.148
18	29.345	29.323	29.330	29.333	35	42	33.5	38	47	37	40.7	....	31.5	.165	.195	.146	.169
19	29.324	29.366	29.397	29.362	38	41	38	41	46	41	42.7	....	33.5	.190	.192	.190	.191
20	29.442	29.509	29.602	29.518	37.5	38	37	39.5	39	38.5	39	....	37	.198	.216	.201	.205
21	29.672	29.636	29.615	29.641	36.5	38.5	35.5	38	41	38	39	....	35	.196	.200	.175	.190
22	29.470	29.493	29.435	29.466	41	41	35.5	43.5	45	38	42.2	....	35.5	.224	.205	.175	.201
23	29.380	29.342	29.300	29.341	40	45	38.5	43	53	42	49.3	....	32.5	.208	.194	.187	.196
24	29.269	29.368	29.435	29.357	41.5	43.5	36	46	49	39	44.7	....	37	.203	.210	.173	.195
25	29.540	29.599	29.548	29.562	32.5	35	34	38	43	38	39.7	....	29.5	.113	.100	.144	.117
26	29.583	29.573	29.494	29.550	34.5	41	35	38	48	38.5	41.5	....	28.5	.167	.166	.158	.164
27	29.456	29.370	29.284	29.370	38	43	38.5	42	50	42.5	44.8	....	36	.177	.186	.181	.181
28	29.297	29.301	29.290	29.296	37.5	43	37	41	50.5	40.5	44	....	39	.179	.179	.175	.178
29	29.274	29.303	29.311	29.296	40.5	44.5	42	45	52	47	48	....	36	.207	.195	.202	.201
30	29.369	29.393	29.334	29.365	42	40	36.5	48	46.5	39	44.5	....	36.5	.189	.163	.183	.178
Means....	29.407	29.412	29.392	29.404	31.9	36.9	33.1	34.9	41.9	35.9	37.6	....	....	.151	.159	.152	.154
May 1	29.289	29.169	29.236	*29.231	45	46.5	42.5	45	53	46	48	....	36.5	.228	.230	.226	.228
2	29.448	29.496	29.475	29.473	33	34	35	36	40	38	38	....	34	.149	.118	.165	.144
3	29.428	29.401	29.347	29.392	33.5	34.5	35	36	38	37	37	....	34	.166	.154	.178	.166
4	29.338	29.344	29.331	29.338	35	35.5	36.5	36.5	38	39.5	38	....	34	.184	.175	.177	.179
5	29.360	29.412	29.430	29.401	33.5	36	36	37	41.5	39	39.2	....	35	.152	.140	.173	.155
6	29.459	29.488	29.442	29.463	35.5	41	36.5	39	47	40	42	....	36	.162	.179	.170	.170
7	29.414	29.399	29.344	29.386	39.5	48	42	43	56.5	47	48.8	....	34	.197	.223	.202	.207
8	29.366	29.346	29.319	29.344	43.5	45.5	39	49	54	43	48.7	....	38	.210	.193	.186	.200
9	29.331	29.312	29.296	29.313	43.5	45	40.5	47	52	45	48	....	38	.237	.207	.194	.213
10	29.219	29.202	29.293	29.238	41	48.5	44	43	50	45.5	46.2	....	40	.231	.321	.268	.273
11	29.429	29.466	29.404	29.433	41	41	39	42	42.5	41	41.8	....	39	.244	.238	.212	.231
12	29.402	29.417	29.420	29.413	42.5	47	41	43	50	42.5	45.2	....	39	.265	.283	.238	.262
13	29.414	29.363	29.340	29.372	40	42.5	38	41.5	45	40.5	42.3	....	35	.228	.239	.196	.221
14	29.369	29.425	29.479	29.424	42	45	41	45.5	52.5	45	47.7	....	38	.221	.201	.205	.209
15	29.447	29.327	29.160	29.311	38	44.5	40	42	51.5	42	45.2	....	35	.177	.201	.182	.187
16	28.975	29.074	29.160	29.070	45	46	41.5	47	52	44	47.7	....	40	.273	.232	.229	.245
17	29.162	29.278	29.364	29.268	41	46	44	43.5	51	47	47.2	....	40.5	.224	.245	.294	.254
18	29.444	29.440	29.421	29.435	43	44	42.5	46.5	52	46	48.2	....	39	.232	.209	.226	.222
19	29.401	29.331	29.290	29.341	45	45	49	51	54.5	55	53.5	....	42.5	.220	.175	.269	.221
20	29.300	29.319	29.363	29.327	47	50	50	51	58.5	54	54.5	....	48.5	.270	.249	.308	.276
21	29.499	29.504	29.521	29.508	52	53	48	56	61	52	56.3	....	49	.335	.297	.282	.271
22	29.620	29.556	29.471	29.549	49	52	47	53.5	59	51	54.5	....	47.5	.288	.296	.270	.285
23	29.418	29.334	29.321	29.358	49.5	53	46.5	53	60	51	54.7	....	45.5	.308	.310	.257	.292
24	29.310	29.241	29.258	29.270	49.5	54	49.5	54	61.5	53	56.2	....	48.5	.294	.318	.308	.307
25	29.256	29.310	29.328	29.298	46.5	49	48	49.5	54.5	52	52	....	45.5	.276	.275	.282	.278
26	29.438	29.486	29.487	29.470	48	53	47	51	59	50.5	63.5	....	43.6	.296	.323	.277	.299
27	29.535	29.551	29.508	29.531	50.5	56	47.5	54.5	66	51	57.2	....	44	.314	.316	.283	.304
28	29.515	29.456	29.381	29.451	51.5	50.5	48	54	61	52	55.7	....	45	.347	.241	.282	.290
29	29.327	29.214	29.213	29.251	50	55.5	49.5	54.5	62	54.5	57	....	47.5	.301	.354	.288	.314
30	28.971	28.881	28.789	28.880	50.5	53	54.5	54.5	58.5	58	57	....	51	.314	.330	.378	.341
31	28.799	28.770	28.761	28.777	53.5	52.5	49.5	56	58	52	55.3	....	50	.377	.322	.321	.340
Means....	29.344	29.332	29.320	29.332	43.7	46.6	40.2	46.9	52.9	46.9	48.9	....	....	.249	.245	.242	.245

of the north and northwestern lakes, at Thunder Bay Island, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.522	.778	.760	.687	W.NW.	S	SE	12.5	37.5	24.0	17.0	S. 6 E	10	10	10	......	.10
.661	.673	.744	.696	N.NW	NW	NW	44.8	35.0	15.0	31.0	N. 34 W	10	2	1	......	....
.628	.510	.598	.579	N	N	Calm	12.6	9.4	0.0	7.3	North	6	0	0	......	....
.563	.610	.782	.652	W	S	S	3.0	12.0	5.0	5.8	S. 10 W	0	0	0	......	....
.720	.587	.719	.675	W	S	NW	2.5	2.0	15.4	5.3	N. 56 W	0	8	10	......	....
.775	.794	.744	.771	N	NE	N	24.2	37.0	33.2	29.0	N. 18 E	10	10	10	......	.50
.669	.462	.698	.610	NE.	N	N	28.0	14.0	3.2	14.3	N. 29 E	4	0	0	......	....
.703	.488	.685	.625	N	NE	Calm	4.0	2.0	0.0	1.9	N. 15 E	5	2	10	......	....
.883	.628	.744	.752	W.NW	S	S	2.0	16.6	20.4	12.0	S. 3 W	0	1	10	......	....
.843	.807	.854	.835	S.	S.SE	S.SE	14.8	7.0	11.2	10.7	S. 12 E	10	10	10	......	....
.789	.719	.797	.768	S.SW	N	N	13.5	12.0	15.5	5.3	N. 19 W	6	10	10	......	.37
.826	.617	.655	.699	N.NW	N.NW.	Calm	25.0	28.4	0.0	17.5	N. 23 W	10	0	0	......	.62
.729	.567	.694	.663	W.NW	S.SE	S.SE	1.0	6.5	4.6	3.4	S. 19 E	0	2	0	......	....
.752	.545	.744	.680	S. SE	E.NE	E.NE	3.0	2.0	2.0	1.6	S. 75 E	0	8	10	......	....
.811	.545	.762	.706	E. SE	E	N	8.0	5.0	7.0	4.4	N. 73 E	10	4	4	......	....
.698	.439	.595	.577	E. NE	E.NE	Calm	3.0	2.0	0.0	1.6	N. 67 E	0	2	1	......	....
.703	.513	.669	.628	N	SE	S.	1.0	3.4	6.0	2.6	S. 18 E	1	1	0	......	....
.719	.594	.665	.659	S. SE	SE	SE	5.6	7.4	9.0	7.0	S. 39 E	2	1	0	......	....
.738	.617	.738	.698	E.SE	E.NE	Calm	9.5	8.0	0.0	5.3	S. 88 E	3	3	10	.136	....
.818	.907	.860	.862	E. SE	E.SE	E.NE	13.0	11.0	12.4	11.3	S. 82 E	10	10	10	.089	....
.858	.781	.765	.801	E	E.NE	E	9.0	11.6	15.0	11.8	N. 83 E	10	5	0	.031	.44
.794	.684	.765	.748	E. SE	E	Calm	17.0	11.0	0.0	9.0	S. 76 E	3	6	2	.145	....
.750	.483	.702	.645	Calm	N	N	0.0	7.0	9.2	5.4	North	1	1	0	.139	....
.653	.606	.726	.662	N.NW	N.NW.	N.NW.	16.6	20.0	20.2	19.0	N. 22 W	2	1	0	.136	....
.494	.373	.628	.498	N. NE	N	Calm	17.4	10.2	0.0	9.0	N. 4 E	0	0	0	.194	....
.759	.494	.677	.643	Calm	S	Calm	0.0	7.0	0.0	2.3	South	0	0	1	.156	....
.661	.515	.665	.614	W	S	Calm	3.6	8.4	0.0	3.0	S. 23 W	2	2	2	.150	....
.695	.488	.692	.592	NE	N.NW.	NW	6.8	4.4	5.0	4.1	N. 2 W	0	3	0	.145	....
.716	.503	.624	.648	N	N	NW	7.2	7.6	7.6	7.0	N. 15 W	0	0	0	.171	....
.563	.513	.770	.615	N	E.NE	Calm	4.0	2.0	0.0	1.7	N. 21 E	0	0	3	.176	....
.716	.595	.717	.676	....	....	....	....	....	....	2.9	N. 21 E	4.2	3.4	3.8	1.688	1.73
.762	.574	.729	.688	SW	S	N	3.2	12.4	9.4	1.9	S. 23 W	2	4	10	.130	....
.705	.476	.717	.633	NE.	NE	Calm	9.8	5.0	0.0	4.9	N. 45 E	10	3	8	.094	....
.753	.673	.807	.744	E	E. SE	E	18.0	13.5	17.6	16.2	S. 84 E	10	10	10	.200	....
.853	.765	.729	.782	E	E	E	16.8	9.0	8.2	11.3	East	10	10	10	.070	.37
.708	.534	.726	.656	E	E	E	30.4	12.6	10.0	17.7	East	10	10	10	.128	....
.681	.554	.688	.641	E.NE	NE	NE	10.2	4.0	2.0	5.3	N. 59 E	10	10	0	.094	....
.709	488	.624	.607	N	Calm	Calm	4.0	0.0	0.0	1.3	North	1	0	0	.146	....
.606	.463	.669	.579	Calm	S	Calm	0.0	2.0	0.0	0.7	South	0	0	2	.224	....
.734	.535	.645	.638	NW	SE	Calm	1.0	5.0	0.0	1.3	S. 45 E	10	2	10	.163	....
.833	.891	.881	.872	S	N	N	3.0	2.4	4.2	1.2	North	5	10	10	.185	....
.914	.873	.824	.870	NE	E	E	6.0	4.6	3.0	4.2	N. 70 E	10	10	10	.027	.39
.957	.786	.873	.872	NE	S	Calm	6.2	9.6	0.0	2.3	S. 39 E	10	5	0	.000	.39
.869	.800	.779	.816	S	S	Calm	1.0	12.4	0.0	4.5	South	10	10	0	.000	....
.726	.508	.684	.639	N.NW	N	N	11.2	7.4	5.0	7.7	N. 11 W	3	6	1	.112	....
.661	.530	.607	.599	W.	S.SE	S	5.4	8.8	11.4	6.6	S. 6 W	0	8	10	.208	....
.847	.598	.796	.747	W	W	W	9.2	5.4	10.0	8.2	West	8	10	10	.084	.32
.794	.653	.772	.740	W	W	NW	10.0	10.8	16.0	11.3	N. 71 W	10	2	8	.170	....
.732	.581	.729	.681	N	N	S	9.0	6.6	5.0	3.5	North	4	8	5	.134	....
.590	.411	.620	.540	W	W	SW	9.0	3.0	9.6	6.7	S. 71 W	2	0	6	.169	....
.722	.506	.738	.689	N	S.	Calm	4.0	5.2	0.0	0.4	South	8	3	0	.187	.28
.747	.553	.727	.676	SW	S.	S.	6.0	15.0	8.4	9.2	S. 9 W	2	0	0	.112	....
.702	.592	.722	.672	W. SW.	S.	SE.	3.0	9.0	1.0	3.7	S. 11 W	4	0	0	.206	....
.765	.509	.686	.083	SE	SE.	Calm	5.4	16.0	0.0	7.1	S. 45 E	0	0	10	.160	....
.705	.583	.765	.684	Calm	S.SE	Calm	0.0	14.5	0.0	4.8	S. 23 E	0	3	0	.120	.09
.783	.647	.727	.719	E	E. NE	NE	6.4	11.2	14.0	10.0	N. 62 E	10	3	0	.200	.04
.790	.647	.753	.730	E. SE	NE.	N	8.6	7.0	2.5	4.5	N. 72 E	8	4	0	.092	....
.740	.495	.755	.663	E	Calm	Calm	2.0	0.0	0.0	0.7	East	0	0	0	.128	....
.834	.467	.727	.676	Calm	E	Calm	0.0	2.0	0.0	0.7	East	0	2	0	.188	....
.709	.638	.677	.675	SE.	SE.	Calm	4.2	6.0	0.0	3.4	S. 45 E	10	10	10	.217	....
.740	.672	.786	.736	E	E	Calm	1.0	2.0	0.0	1.0	East	10	10	10	.206	....
.840	.669	.827	.779	W.NW.	NE	SE	4.4	8.6	8.2	2.7	N. 76 E	10	10	10	.074	.22
.758	.605	.735	.699	....	....	....	....	....	....	1.9	S. 77 E	6.0	5.2	5.0	4.223	2.10

M.—*Reductions of the monthly meteorological register of the survey of*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	28. 677	28. 732	28. 869	28. 759	49. 5	47. 5	46	51	50	48	49. 7	....	45. 5	. 335	. 296	. 284	. 338
2	29. 038	29. 150	29. 246	29. 145	47. 5	49	46	48. 5	52	48	49. 5	....	46	. 316	. 308	. 284	. 303
3	29. 334	29. 337	29. 296	29. 322	46. 5	51	46. 5	49	56. 5	49	51. 5	....	40	. 284	. 302	. 284	. 290
4	29. 256	29. 197	29. 258	29. 237	47	51	47	49. 5	56	48. 5	51. 3	....	43	. 290	. 308	. 303	. 300
5	29. 314	29. 382	29. 481	29. 396	44. 5	49	44. 5	46	55	48	49. 7	....	42	. 274	. 269	. 254	. 266
6	29. 595	29. 627	29. 631	29. 618	48	49	47	52. 5	57	50	53. 2	....	41. 5	. 276	. 242	. 283	. 267
7	29. 661	29. 646	29. 588	29. 632	48. 5	49. 5	48	53. 5	57	52	54. 2	....	42	. 275	. 256	. 282	. 271
8	29. 588	29. 531	29. 481	29. 533	49	54. 5	51. 5	54. 5	64. 5	58	59	....	44	. 275	. 293	. 295	. 288
9	29. 492	29. 387	29. 380	29. 420	55. 5	54	51	63	64. 5	56	61. 2	....	48	. 342	. 279	. 308	. 310
10	29. 320	29. 241	29. 251	29. 271	52. 5	55. 5	47	60	63	52	58. 3	....	49. 5	296	. 342	. 257	. 298
11	29. 260	29. 271	29. 306	29. 279	53	55	53	56	62. 5	57. 5	58. 7	....	47. 5	. 363	. 334	. 343	. 347
12	29. 375	29. 404	29. 422	29. 400	54	54	54	59. 5	62. 5	58	60	....	51. 5	. 345	. 305	. 365	. 338
13	29. 484	29. 478	29. 492	29. 485	58	59. 5	52. 5	62. 5	67. 5	58	62. 7	....	50	. 423	. 402	. 322	. 382
14	29. 427	29. 353	29. 273	29. 351	57. 5	62	63. 5	60. 5	71	70	67. 2	....	54	. 435	. 436	. 499	. 457
15	29. 343	29. 445	29. 515	29. 434	63	56	47. 5	68	65	58	63. 7	....	52	. 509	. 330	. 191	. 343
16	29. 607	29. 466	29. 247	29 440	49. 5	53. 5	48. 5	54	63	53	56. 7	....	46	. 295	. 342	. 283	. 307
17	29. 120	29. 098	29. 124	29. 114	52	60	57	55	70	62	62. 3	....	46	. 349	. 385	. 399	. 378
18	29. 107	29. 001	29. 065	29 058	54	55	49	57	60. 5	52	56. 5	....	50. 5	. 378	. 360	. 308	. 349
19	29. 098	29. 124	29. 138	29 120	50	52	51	54	59	53	55. 3	....	49	. 308	. 396	. 348	. 351
20	29. 082	29. 081	29. 140	29 101	50	55	52. 5	52. 5	57	55	64. 8	....	46. 5	. 328	. 407	. 362	. 366
21	29. 170	29. 161	29. 191	29. 174	52. 5	60	48. 5	55. 5	66	51	57. 5	....	49. 5	. 356	. 438	. 309	. 368
22	29. 195	29. 234	29. 307	29. 245	52	56	51	54	61	55	56. 7	....	47. 5	. 362	. 383	. 321	. 355
23	29. 417	29. 442	29. 490	29. 450	50	53. 5	50	52. 5	57	53	54. 2	....	50	. 355	. 362	. 321	. 346
24	29. 540	29. 508	29. 467	29. 505	52. 5	57. 5	55	56	64	55. 5	58. 5	....	47	. 349	. 385	. 370	. 378
25	29. 480	29. 432	29. 450	29. 454	56. 5	61	55	59. 5	67	58. 5	61. 7	....	52	. 217	. 457	. 387	. 354
26	29. 454	29. 455	29. 437	29 449	58	64	56	62. 5	73	60. 5	65. 3	....	53	. 423	. 476	. 389	. 429
27	29. 444	29. 443	29. 384	29. 424	61	63. 5	57. 5	65	70	62	69	....	57. 5	. 205	. 500	. 415	. 373
28	29. 356	29. 384	29. 249	29. 330	62	65	58	65	75	63	67. 7	....	57	. 516	. 483	. 416	. 472
29	29. 215	29. 122	29 086	29. 141	60	66	62	63	75	64. 5	67. 5	....	60	. 478	. 519	. 522	. 506
30	29. 113	29. 191	29. 252	29. 185	63	63	60	65	66	62	64. 3	....	59. 5	. 549	. 536	. 491	. 525
Means...	29. 319	29. 312	29. 314	29. 315	53. 2	56. 1	53. 2	56. 8	62. 9	55. 7	58. 5	....	....	. 350	. 371	. 340	. 354

the north and northwestern lakes, at Thunder Bay island, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.894	.821	.850	.855	W.NW.	W.NW	NW...	13.0	19.8	26.0	19.2	N. 58 W.	10	10	10	.340	.62
.925	.794	.850	.856	N.NW.	N.NW.	N.NW.	10.6	11.4	11.6	11.2	N. 23 W.	10	10	10	.140	.34
.817	.660	.817	.761	N.NW.	SE....	S	9.0	5.6	5.0	0.2	S. 40 E..	2	8	10	.246	....
.819	.678	.888	.798	S	S	Calm..	6.5	10.0	0.0	5.5	South ...	8	10	6	.214	....
.882	.620	.775	.759	N.NW.	N	N	9.4	4.0	6.0	6.3	N. 11 W.	10	2	0	.150	....
.696	.521	.786	.668	N	N	N	11.6	10.6	17.4	13.2	North ...	1	2	10	.164	....
.671	.549	.727	.649	N	N	N	8.2	16.8	17.0	14.0	North ...	1	0	0	.202	.18
.647	.483	.613	.581	NW....	N.NW.	N	24.8	20.0	9.0	17.3	N. 29 W.	0	1	0	.239	....
.594	.460	.687	.580	N	N	Calm..	4.0	8.0	0.0	4.0	North ...	0	2	1	.256	....
.572	.594	.660	.609	Calm...	S.SE..	Calm..	0.0	14.4	0.0	4.8	S. 23 E..	1	10	2	.139	....
.809	.590	.725	.708	N	N.NE.	Calm..	2.0	2.0	0.0	1.3	N. 12 E..	10	10	1	.209	....
.678	.539	.756	.658	N	N	N	1.0	12.0	6.0	6.3	North ...	2	2	1	.214	....
.748	.598	.669	.668	Calm...	SE....	E	0.0	9.5	1.0	3.4	S. 49 E..	6	3	2	.142	....
.824	.576	.781	.727	SE.....	S.SE..	W.NW	1.0	10.4	4.0	2.5	S. 7 E...	8	2	0	.250	....
.743	.535	.396	.558	NW....	N	Calm..	17.0	17.0	0.0	10.5	N. 23 W.	0	0	1	.240	....
.706	.594	.699	.666	E. SE..	SE....	SE....	11.0	9.4	22.0	14.0	S. 50 E..	8	2	1	.195	....
.805	.525	.718	.683	NE	N	N	10.6	17.4	6.0	10.5	N. 14 E..	10	10	3	.221	....
.812	.683	.794	.763	S	S	N	4.4	13.0	13.0	1.5	South ...	2	0	0	.180	....
.738	.592	.864	.731	N	N.NE.	Calm..	7.0	10.4	0.0	5.7	N. 13 E..	10	10	10	.268	....
.829	.874	.838	.847	E	S	N	5.0	3.0	6.0	1.9	N. 59 E..	10	10	6	.330	.22
.807	.685	.824	.772	W.NW.	S.SE..	Calm..	9.0	7.6	0.0	2.2	S. 56 W.	10	10	10	.130	.26
.867	.713	.743	.774	Calm...	N	N	0.0	11.6	20.6	10.7	North ...	10	8	8	.155	.08
.836	.782	.798	.805	NW....	N.NE.	Calm..	12.4	7.8	0.0	5.2	N. 19 W.	10	10	8	.115	....
.778	.650	.839	.756	W.NW.	S	S	3.5	11.0	10.6	7.0	S. 9 W...	1	1	1	.148	....
.841	.690	.788	.766	S	S	Calm..	7.6	11.6	0.0	6.4	South ...	0	1	0	.172	....
.748	.588	.739	.692	S	S	S	1.0	5.2	7.4	4.5	South ...	0	0	3	.180	....
.684	.681	.746	.704	S	S.SE..	Calm..	5.2	7.0	0.0	4.0	S. 13 E..	4	2	0	.178	....
.836	.558	.723	.706	S	S	SE....	4.4	4.0	2.0	3.3	S. 8 E...	2	1	5	.192	....
.831	.599	.862	.764	SE.....	S	S	6.6	16.0	11.0	10.7	S. 8 E...	10	10	10	.535	....
.890	.838	.884	.871	S.SW..	NE ...	NE ...	3.0	7.2	10.5	4.9	N. 50 E..	10	10	10	.115	.36
.777	.636	.764	.726	....	....	....	....	....	....	2.1	N. 10 W.	5.5	5.2	4.4	6.259	2.06

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Aug. 1	29.449	29.405	29.445	29.433	54	71	71	57	74	74	68.3	77	57	.378	.718	.718	.605
2	29.504	29.451	29.386	29.447	53	63	63	57	68	68	64.3	74	56	.350	.509	.509	.456
3	29.235	29.124	29.145	29.168	63	72	70	66	77	75	72.7	78	65	.536	.718	.666	.640
4	29.223	29.232	29.232	29.229	66	74	71	70	78	77	75.0	79	69	.586	.785	.678	.650
5	29.345	29.380	29.481	29.402	65	69	62	69	73	67	69.7	77	67	.564	.741	.489	.565
6	29.570	29.551	29.496	29.539	50	63	65	53	68	68	63.0	69	52	.321	.509	.577	.469
7	29.398	29.276	29.289	29.321	64	78	79	68	82	85	78.3	86	65	.543	.904	.909	.785
8	29.264	29.161	29.089	29.171	73	77	77	78	84	82	81.3	85	78	.744	.832	.860	.812
9	29.104	29.177	29.268	29.183	69	71	67	74	76	73	74.3	82	73	.641	.691	.581	.638
10	29.382	29.373	29.310	29.355	55	68	68	58	72	74	68.0	74	58	.393	.634	.604	.544
11	29.228	29.127	29.275	29.210	69	75	69	73	78	76	75.7	81	72	.655	.827	.614	.699
12	29.474	29.535	29.566	29.525	56	66	60	61	71	64	65.3	76	61	.383	.572	.465	.473
13	29.630	29.538	29.398	29.522	48	63	68	51	68	73	66.0	74	50	.296	.509	.618	.474
14	29.275	29.235	29.336	29.282	63	66	58	68	70	65	67.7	73	65	.509	.586	.389	.495
15	29.500	29.496	29.584	29.527	47	58	53	51	64	62	59.0	67	50	.270	.403	.284	.319
16	29.700	29.701	29.661	29.687	44	57	60	47	63	65	58.3	65	46	.249	.386	.451	.362
17	29.646	29.508	29.483	29.546	53	62	64	58	67	69	64.7	70	57	.336	.489	.529	.451
18	29.536	29.508	29.496	29.513	54	64	61	59	69	67	65.0	70	59	.351	.529	.457	.446
19	29.430	29.358	29.368	29.385	48	67	66	50	71	72	64.3	74	50	.309	.608	.559	.492
20	29.444	29.445	29.471	29.453	54	64	62	58	69	67	64.7	72	57	.365	.529	.489	.461
21	29.476	29.268	29.268	29.371	54	67	68	57	70	71	66.0	72	57	.378	.622	.644	.548
22	29.092	29.102	29.233	29.142	65	70	64	68	74	70	70.7	75	68	.577	.679	.516	.591
23	29.336	29.483	29.636	29.492	54	62	54	58	67	61	62.0	70	57	.365	.489	.323	.393
24	29.733	29.636	29.586	29.652	52	61	60	57	65	65	62.3	68	48	.322	.483	.451	.419
25	29.508	29.375	29.458	29.447	54	66	71	58	70	75	67.7	75	57	.365	.586	.704	.551
26	29.311	29.217	29.248	29.259	63	72	68	67	76	71	71.3	77	67	.522	.731	.644	.632
27	29.205	29.211	29.238	29.218	63	68	64	67	73	68	69.3	74	67	.522	.6 8	.543	.561
28	29.271	29.213	29.285	29.256	57	69	67	60	73	74	69.0	78	60	.426	.655	.568	.550
29	29.436	29.481	29.589	29.502	54	62	53	59	68	61	62.7	74	58	.351	.476	.354	.394
30	29.655	29.571	29.511	29.579	42	60	61	45	61	67	58.7	68	45	.228	.465	.457	.383
31	29.386	29.153	28.997	29.179	53	61	65	56	65	69	63.3	69	56	.363	.483	.564	.470
Means....	29.412	29.367	29.381	29.387	56.7	66.7	64.9	60.5	71.2	70.1	67.3	....	....	.425	.602	.555	.527
Sept. 1	28.948	29.045	29.265	29.086	64	56	46	68	61	51	60.0	70	51	.543	.383	.245	.390
2	29.471	29.430	29.420	29.440	41	51	50	44	55	55	51.3	59	44	.218	.321	.295	.278
3	29.456	29.346	29.431	29.411	41	59	62	43	63	68	58.0	70	43	.231	.447	.476	.384
4	29.358	29.334	29.364	29.352	60	71	73	64	76	78	72.6	79	64	.465	.691	.744	.633
5	29.383	29.312	29.293	29.329	67	70	69	72	75	75	74.0	79	72	.595	.666	.628	.629
6	29.364	29.329	29.276	29.323	56	55	57	60	60	61	60.3	75	59	.396	.367	.412	.391
7	29.223	29.298	29.201	29.240	64	68	64	67	70	69	68.6	75	61	.556	.658	.529	.581
8	29.238	29.396	29.534	29.389	57	60	55	61	65	61	62.3	70	60	.412	.451	.354	.405
9	29.673	29.613	29.590	29.625	42	60	50	45	64	61	56.6	68	45	.228	.465	.216	.303
10	29.610	29.541	29.508	29.553	44	62	61	47	66	65	59.3	67	46	.249	.502	.483	.411
11	29.412	29.260	29.192	29.288	53	69	68	55	72	71	66.0	72	55	.376	.668	.644	.562
12	29.477	29.632	29.745	29.618	52	55	47	56	58	52	55.3	71	52	.335	.393	.257	.328
13	29.774	29.720	29.665	29.719	48	50	51	51	54	54	53.0	54	48	.296	.308	.335	.313
14	29.660	29.574	29.506	29.580	50	58	60	53	60	64	59.0	65	53	.321	.456	.465	.412
15	29.521	29.589	29.649	29.589	56	59	56	58	62	59	59.6	64	56	.422	.460	.409	.430
16	29.657	29.576	29.516	29.583	52	55	57	55	58	60	57.6	60	55	.349	.393	.426	.389
17	29.339	29.208	29.091	29.212	58	62	63	62	64	65	63.6	65	59	.429	.529	.516	.491
18	29.078	29.253	29.398	29.243	61	63	57	64	66	61	63.6	66	61	.497	.536	.412	.481
19	29.590	29.566	29.581	29.579	45	57	56	47	60	59	55.3	61	46	.273	.426	.409	.369
20	29.489	29.427	29.535	29.483	48	65	61	50	67	66	61.0	72	50	.309	.591	.470	.456
21	29.600	29.530	29.483	29.537	49	63	62	52	65	65	60.6	66	52	.308	.549	.516	.457
22	29.476	29.425	29.453	29.451	58	67	64	62	71	69	67.3	73	61	.429	.608	.529	.522
23	29.382	29.224	29.356	29.320	53	68	57	56	72	62	63.3	74	56	.363	.631	.399	.464
24	29.537	29.496	29.494	29.509	46	54	52	48	57	57	54.0	63	47	.284	.378	.322	.328
25	29.491	29.363	29.381	29.411	42	57	55	44	61	60	55.0	64	44	.241	.412	.367	.340
26	29.450	29.373	29.406	29.409	45	60	58	48	64	63	58.3	66	47	.260	.465	.416	.380
27	29.453	29.363	29.316	29.377	43	62	61	46	65	65	58.6	68	46	.238	.516	.483	.412
28	29.218	29.263	29.305	29.283	57	65	63	60	68	67	65.0	70	59	.426	.577	.522	.508
29	29.432	29.463	29.481	29.458	52	53	51	55	56	54	55.0	67	53	.349	.363	.335	.349
30	29.523	29.526	29.513	29.520	51	52	52	54	55	55	54.6	55	49	.335	.349	.349	.344
Means....	29.445	29.412	29.431	29.430	51.7	60.2	57.9	54.9	63.7	62.4	60.3	....	....	.358	.485	.432	.425

of the north and northwestern lakes, at Tawas City, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.812	.856	.856	.841	W	W.NW	N.NE	0.5	4.0	2.0	1.6	N. 46 W.	3	9	10	.174	....
.752	.743	.743	.746	N.NE	E.SE	E	4.0	3.5	13.0	5.9	N. 82 E.	1	2	5	.108	....
.838	.774	.768	.793	S	S	W	7.0	11.0	6.0	6.3	S. 19 W.	7	8	10	.222	....
.799	.819	.731	.783	W.SW	S	S.SW	6.0	12.0	9.0	8.0	S. 21 W.	2	6	10	.146	.01
.796	.764	.740	.767	W.NW	E.NE	NW	1.5	12.0	0.5	3.7	N. 60 E.	10	5	0	.175	.12
.798	.743	.843	.795	NW	E.SE	E	2.0	[illegible]	13.0	6.7	S. 84 E.	1	2	10	.149	....
.793	.828	.756	.792	S	S.SW	W	6.0	4.0	2.0	6.7	S. 21 W.	10	8	8	.126	.38
.776	.714	.787	.759	SW	S	S.SW	5.0	7.0	7.0	9.2	S. 13 W.	10	4	2	.274	....
.764	.771	.716	.750	W	NW	NW	4.0	7.0	3.0	4.3	N. 57 W.	9	4	1	.228	.32
.816	.804	.720	.780	N.NW	E	SE	1.0	7.5	12.0	5.8	S. 64 E.	1	3	8	.268	....
.807	.863	.685	.785	S.SW	S.SW	NW	7.0	8.0	1.5	4.9	S. 28 W.	9	7	1	.175	....
.713	.754	.780	.749	W	E	NW	2.0	10.0	2.0	2.3	N. 78 E.	1	6	0	.147	.22
.790	.743	.761	.765	NW	S	S.SW	1.5	14.0	2.5	5.2	S. 7 W.	3	3	10	.198	....
.743	.799	.631	.724	SW	NW	W.NW	4.0	3.5	5.0	3.3	N. 81 W.	10	10	1	.209	.04
.722	.675	.511	.636	NW	W.NW	N	6.0	7.0	0.5	4.3	N. 55 W.	1	6	1	.060	....
.772	.670	.731	.724	NW	SE	S	4.0	9.0	19.0	7.6	S. 9 E.	2	2	2	.227	....
.698	.740	.747	.728	W.SW	S.SW	W	4.5	16.0	3.3	7.2	S. 39 W.	9	10	9	.192	....
.703	.747	.690	.713	NW	E	E.SE	2.0	16.0	4.0	3.6	S. 89 W.	1	2	1	.148	....
.856	.802	.712	.790	W	S	W.SW	5.0	13.0	4.5	5.8	S. 13 W.	7	3	1	.164	....
.756	.747	.740	.748	NW	SE	N	2.5	6.5	1.5	1.0	S. 63 E.	6	6	4	.159	....
.812	.848	.850	.837	N	E	W	1.0	4.0	0.3	1.3	N. 74 E.	8	10	10	......	.18
.843	.810	.704	.786	W	W	NW	4.0	9.0	1.5	4.7	N. 86 W.	10	8	1	.072	.42
.756	.740	.606	.701	W.NW	N	NW	3.0	6.0	2.0	3.2	N. 26 W.	10	1	0	.132	....
.692	.783	.731	.735	SE	S.SE	W	14.0	7.0	0.5	6.7	S. 37 E.	1	7	1	.194	....
.756	.799	.812	.789	W.SW	SW	W	6.0	6.5	0.5	4.2	S. 57 W.	10	10	10	.231	....
.790	.815	.850	.818	W	S.SW	NE	3.0	15.0	2.0	4.8	S. 30 W.	10	4	9	......	....
.790	.761	.793	.781	S	NE	N	8.0	3.0	0.5	1.9	S. 21 E.	2	9	4	......	1.58
.822	.807	.677	.769	NW	W	NW	3.5	5.0	4.0	3.8	N. 63 W.	3	5	2	.054	.31
.703	.695	.659	.686	NW	E.NE	W.NW	3.0	17.0	2.5	5.5	N. 49 E.	10	6	2	.242	....
.762	.780	.690	.744	NW	S	SW	3.0	15.5	3.0	5.4	S. 15 W.	7	2	1	.190	....
.809	.783	.796	.796	SW	SW	S.SW	2.0	5.5	10.0	5.6	S. 32 W.	7	10	10	.150	....
.775	.773	.736	.761	....	....	....	....	....	....	2.1	S. 11 W.	5.8	5.7	4.6	4.814	3.58
.793	.713	.653	.719	W.NW	N.NW	W.NW	10.0	8.5	3.0	6.7	N. 51 W.	7	10	5	.141	.13
.756	.743	.681	.726	NW	S	NW	4.0	11.0	2.0	2.7	S. 32 W.	2	2	0	.137	....
.833	.776	.695	.768	S	S	S.SW	1.0	24.0	8.0	10.8	S. 6 W.	2	2	0	.184	....
.780	.771	.776	.775	SW	S	SW	6.0	14.0	6.0	8.0	S. 21 W.	2	6	10	.000	....
.758	.768	.724	.750	SW	SW	N.NE	5.0	6.0	3.0	2.7	S. 55 W.	10	8	10	......	.47
.765	.708	.769	.747	NE	NE	E	3.0	2.0	6.0	3.3	N. 70 E.	10	10	10	.020	.95
.841	.898	.747	.828	SW	SW	SW	10.0	10.0	3.0	7.7	S. 45 W.	7	7	2	.142	.35
.769	.731	.659	.719	W.SW	W	W	8.0	12.0	2.0	7.2	S. 81 W.	1	8	0	.230	....
.762	.780	.402	.648	W	S.SE	NW	2.0	6.5	1.0	1.7	S. 2 W.	0	1	0	.098	....
.772	.786	.783	.780	NW	S.SE	NW	1.0	9.0	2.0	2.1	S. 12 E.	2	1	0	.090	....
.869	.852	.850	.857	NW	S	S.SW	3.0	8.0	10.0	5.3	S. 20 W.	10	10	10	.097	....
.747	.816	.660	.741	NW	NW	W.NW	10.0	8.5	3.0	7.1	N. 48 W.	2	4	10	.203	.14
.790	.738	.802	.776	NE	E.NE	SE	14.0	17.5	16.0	12.3	N. 82 E.	10	10	2	.116	....
.798	.880	.780	.819	W	SE	SE	0.5	11.0	6.0	5.5	S. 44 E.	10	8	1	.016	....
.876	.828	.819	.841	W.SW	N	NW	1.5	4.0	1.0	1.5	N. 26 W.	10	10	10	.030	....
.805	.816	.822	.814	E.NE	E.NE	SE	14.0	14.0	12.0	11.5	N. 86 E.	10	9	10	.080	....
.772	.888	.836	.832	SE	SE	NE	10.0	3.5	5.0	4.8	S. 65 E.	10	10	10	.000	....
.833	.838	.769	.813	W.SW	W.NW	NW	2.5	7.0	1.0	3.3	N. 75 W.	9	6	1	.130	1.53
.847	.822	.819	.829	W	E	S.SE	2.0	10.5	8.5	4.7	S. 56 E.	7	3	1	.104	....
.856	.893	.735	.828	SW	S.SW	N	3.0	6.0	3.0	2.1	S. 44 W.	1	2	1	.081	....
.794	.890	.836	.840	NW	S.SE	SW	1.5	4.0	10.0	4.0	S. 35 W.	1	2	2	.111	....
.772	.802	.747	.773	SW	SW	W	4.0	12.5	2.5	6.0	S. 51 W.	7	7	2	.155	....
.809	.804	.718	.777	SW	SW	NW	2.5	11.0	3.0	4.7	S. 57 W.	4	9	10	.076	....
.850	.812	.692	.784	NW	W	W.NW	4.0	5.0	2.0	3.4	N. 69 W.	1	5	1	.161	.50
.836	.769	.708	.771	W	S.SW	SW	5.5	17.5	5.0	8.3	S. 39 W.	0	2	9	.122	....
.777	.780	.723	.760	W	S	SW	5.5	21.0	1.0	7.5	S. 17 W.	8	1	1	.095	....
.767	.836	.783	.795	W.NW	E.SE	S.SW	3.0	5.0	3.0	1.2	S. 11 E.	1	8	2	.106	....
.822	.843	.790	.818	S.SW	S	NW	4.0	18.0	0.3	7.3	S. 4 W.	10	7	10	.020	....
.805	.809	.802	.805	NW	NE	NW	4.0	14.0	1.5	5.0	N. 24 E.	10	9	2	.006	.49
.802	.805	.805	.804	NE	E.NE	E.NE	19.0	19.0	20.0	19.0	N. 60 E.	10	10	10	......	....
.802	.806	.746	.785	....	....	....	....	....	....	1.6	S. 1 W.	5.8	6.2	4.7	2.551	4.56

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
October 1	29.459	29.401	29.418	29.426	53	55	56	56	58	59	57.6	59	54	.363	.393	.409	.388
2	29.295	29.350	29.453	29.366	60	65	62	63	67	65	65.0	70	59	.478	.591	.516	.528
3	29.448	29.356	29.235	29.346	57	61	61	60	63	64	62.3	66	59	.426	.510	.497	.478
4	29.020	29.236	29.574	29.276	65	58	49	68	62	55	61.6	68	55	.517	.429	.269	.425
5	29.800	29.716	29.674	20.730	38	50	51	40	54	55	49.6	58	40	.203	.308	.321	.277
6	29.417	29.078	29.035	29.176	51	51	59	54	55	62	57.0	63	53	.335	.321	.460	.372
7	29.107	29.037	28.990	29.044	64	66	65	67	67	68	67.3	72	63	.556	.626	.577	.586
8	29.007	28.942	29.175	29.041	67	70	60	70	74	66	70.0	75	66	.622	.679	.438	.579
9	29.462	29.529	29.574	29.522	49	51	51	53	55	54	54.0	66	51	.295	.321	.335	.317
10	29.547	29.483	29.479	29.503	49	48	49	51	51	51	51.0	54	51	.321	.296	.321	.313
11	29.613	29.590	29.577	29.593	41	46	42	43	48	46	45.6	51	42	.231	.284	.215	.243
12	29.553	29.429	29.390	29.457	32	47	45	33	49	49	43.6	54	32	.168	.297	.247	.237
13	29.334	29.299	29.332	29.322	35	52	49	37	55	52	48.0	57	36	.178	.349	.308	.278
14	29.494	29.572	29.590	29.552	44	44	37	47	46	42	45.0	52	42	.249	.262	.155	.233
15	29.676	29.520	29.417	29.558	31	41	42	32	43	45	40.0	45	32	.162	.231	.228	.207
16	29.133	29.066	29.241	29.147	42	44	44	44	46	47	45.6	49	42	.241	.262	.249	.251
17	29.461	29.525	29.503	29.526	34	44	42	36	46	44	42.0	48	34	.170	.262	.241	.224
18	29.556	29.342	29.256	29.384	37	51	54	38	54	57	49.6	58	36	.207	.335	.378	.307
19	29.287	29.422	29.600	29.436	42	44	38	46	47	40	44.3	57	40	.215	.249	.203	.222
20	29.466	29.297	28.986	29.283	33	38	44	34	40	46	40.0	47	33	.175	.203	.284	.221
21	28.863	28.811	28.806	28.827	44	52	44	47	55	48	50.0	47	46	.249	.349	.236	.278
22	29.104	29.221	29.437	29.254	38	42	37	40	44	40	41.3	48	40	.203	.241	.181	.208
23	29.656	29.657	29.472	29.595	30	41	41	32	43	44	39.6	44	42	.144	.231	.218	.198
24	29.253	29.280	29.558	20.364	42	45	38	44	48	41	44.3	49	41	.241	.260	.190	.230
25	29.812	29.870	29.867	29.816	30	30	28	32	32	30	31.3	41	30	.144	.144	.130	.139
26	29.711	29.506	29.443	29.553	21	32	31	22	33	31	28.6	34	20	.101	.168	.174	.148
27	29.285	29.266	29.323	29.291	22	35	37	23	36	39	32.6	40	22	.107	.191	.194	.164
28	29.343	29.239	29.232	29.271	34	40	38	35	42	40	39.0	41	35	.181	.221	.203	.202
29	29.383	29.488	29.565	29.479	38	44	39	39	46	42	42.3	49	38	.216	.284	.199	.233
30	29.345	29.182	29.276	29.268	43	52	53	45	55	58	52.6	60	37	.251	.349	.336	.312
31	29.220	29.062	29.267	29.183	44	58	52	46	64	59	56.3	66	43	.262	.403	.296	.320
Means....	29.374	29.347	29.379	29.373	42.2	48.3	46.3	44.4	50.9	49.6	48.3	....	....	.269	.324	.291	.294
Nov. 1	29.380	29.104	29.240	29.241	43	47	48	47	51	52	50.0	59	46	.225	.270	.282	.259
2	29.285	29.156	29.136	29.192	40	39	35	44	41	37	40.6	57	37	.195	.212	.178	.195
3	29.223	29.468	29.596	29.429	33	37	32	35	39	35	36.3	41	35	.162	.194	.142	.166
4	29.537	29.380	29.360	29.426	35	43	43	37	46	46	43.0	48	32	.178	.238	.238	.218
5	29.268	29.411	29.576	29.418	41	37	31	41	40	33	38.0	46	33	.235	.181	.151	.189
6	29.508	29.323	29.391	29.407	21	....	32	23	31	34	29.3	35	22	.090	....	.155	.122
7	29.554	29.606	29.616	29.592	32	32	....	32	33	31	32.0	35	31	.181	.168	....	.174
8	29.550	29.451	29.531	29.511	25	35	32	26	37	34	32.3	40	24	.123	.178	.155	.152
9	29.583	29.541	29.608	29.577	23	40	34	25	42	37	34.6	45	23	.100	.221	.157	.159
10	29.649	29.577	29.487	29.571	32	38	39	33	40	42	38.3	42	32	.168	.203	.199	.190
11	29.169	28.998	29.141	29.103	40	45	45	42	47	48	45.6	41	41	.221	.273	.260	.252
12	29.490	29.451	29.433	29.458	35	34	32	36	36	35	35.6	48	34	.191	.170	.142	.168
13	29.549	29.513	29.539	29.533	30	33	35	31	36	38	35.0	39	30	.155	.149	.165	.156
14	29.569	29.708	29.989	29.755	32	32	25	35	34	26	31.6	39	26	.142	.155	.123	.140
15	30.130	30.106	30.082	30.106	17	26	30	19	28	31	26.0	32	17	.071	.117	.155	.114
16	29.956	29.792	29.721	29.823	32	36	36	33	38	38	36.3	41	30	.168	.186	.186	.180
17	29.670	29.712	29.802	29.728	36	38	36	38	41	39	39.3	43	37	.186	.190	.173	.186
18	29.652	29.602	29.462	29.572	36	38	39	39	40	41	40.0	43	37	.173	.203	.212	.196
19	29.345	29.255	29.248	29.283	39	39	37	41	41	40	40.6	42	39	.212	.212	.181	.201
20	29.102	29.215	29.369	29.229	33	33	27	34	35	30	33.0	41	30	.175	.162	.113	.150
21	29.325	29.185	29.198	29.236	19	33	32	22	34	35	30.3	38	20	.069	.175	.142	.129
22	29.221	29.366	29.499	29.362	30	32	30	31	34	31	32.0	35	29	.155	.155	.155	.155
23	29.612	29.502	29.456	29.523	25	....	30	27	27	31	28.3	33	24	.112	....	.155	.138
24	29.268	29.139	29.114	29.174	30	35	36	32	37	38	35.6	38	29	.144	.178	.186	.169
25	29.127	29.195	29.250	29.191	34	35	33	36	37	35	36.0	38	34	.170	.178	.162	.170
26	29.289	29.288	29.278	29.285	29	31	32	30	31	34	31.6	35	29	.149	.174	.155	.159
27	29.115	28.909	28.935	29.016	30	29	29	31	30	30	30.3	34	29	.155	.149	.149	.151
28	28.880	28.846	28.949	28.891	25	27	30	26	29	31	28.6	32	25	.123	.124	.155	.134
29	29.075	29.064	29.192	29.110	28	30	32	29	31	32	36.0	32	29	.142	.155	.181	.159
30	29.244	29.198	29.273	29.238	30	31	32	30	32	34	32.0	34	29	.167	.162	.155	.162
Means....	49.410	29.372	29.416	29.399	31.1	35.2	33.9	32.8	36.6	35.9	35.1	....	....	.158	.183	.171	.171

of the north and northwestern lakes, at Tawas City, Michigan.

VAPOR.				WIND.								Amount of cloudiness.				
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.	(0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.809	.816	.819	.815	E. SE..	E	SE....	12.0	4.0	9.0	8.0	S. 62 E..	10	10	10	.000	.20
.831	.893	.836	.853	S	E	W	5.0	3.5	0.3	2.0	S. 33 E..	10	8	1	.029	.19
.822	.886	.833	.847	NE	E. NE.	S	5.0	1.0	16.0	4.3	S. 20 E..	10	10	2	.003	.04
.843	.772	.620	.745	SW	W	NW...	11.0	10.0	8.0	7.8	S. 85 W.	10	6	1	.195	.04
.820	.738	.743	.767	NW....	S	SE....	2.0	2.0	16.0	5.2	S. 40 E..	1	0	0	.097	....
.802	.743	.828	.791	SW	S. SW.	SW ...	18.0	14.0	3.5	11.6	S. 36 W.	10	10	10	.000	....
.841	.946	.843	.876	SW	SW	SW ...	1.5	3.0	14.0	6.2	S. 45 W	10	9	3	......	1.01
.848	.810	.685	.781	S. SW..	S. SW.	W	10.0	15.5	5.0	9.3	S. 32 W	9	9	10	.157	.50
.733	.743	.802	.763	NW....	S	NW...	0.5	10.0	2.0	2.8	S. 12 W.	9	9	10	.097	.10
.859	.790	.859	.836	N	NW...	NW...	1.0	0.3	0.5	0.5	N. 49 W.	10	10	10	.000	....
.833	.850	.691	.791	N	W	NW...	2.0	3.5	2.0	2.0	N. 55 W.	10	2	1	.083	.14
.893	.853	.710	.819	W.NW.	S	S	3.0	10.0	9.0	6.0	S. 9 W..	2	1	0	.072	....
.807	.805	.794	.802	NW....	S. SW.	W.NW	0.3	15.0	2.5	5.1	S. 33 W.	1	3	4	.081	....
.722	.843	.577	.731	N. NW.	N	NW...	6.0	11.0	2.0	6.0	N. 12 W.	10	4	1	.084	....
.896	.833	.762	.830	NW....	SE....	SW ...	4.0	7.0	4.0	1.7	S. 8 W..	9	6	10	.014	....
.836	.843	.772	.817	SW	W. SW	NW...	6.0	6.5	0.3	4.1	S. 58 W.	10	10	2	......	.16
.802	.843	.836	.827	W.NW.	West..	NW...	2.0	4.0	0.5	2.0	N. 79 W.	6	8	1	.077	.14
.905	.802	.812	.839	S. SW..	S. SW.	S. SW..	9.0	21.0	9.5	13.0	S. 23 W.	2	4	2	.117	....
.691	.772	.820	.761	W	W.NW	NW...	5.0	9.0	3.0	5.5	N. 71 W.	2	8	10	.108	....
.895	.820	.850	.855	W	SW ...	S. SW.	1.5	10.0	11.0	7.1	S. 35 W.	5	10	10	.068	....
.772	.805	.704	.760	W. SW.	W	W. SW	6.0	7.5	8.0	7.0	S. 75 W.	3	4	10	.042	....
.820	.836	.732	.796	W	NW...	W	4.5	8.0	6.0	5.7	N. 71 W.	9	10	3	......	.10
.794	.833	.756	.794	NW....	S. SW.	S	0.3	8.0	24.0	10.3	S. 6 W..	4	10	10	......	.06
.836	.777	.738	.783	SW	W	W	4.0	8.0	4.0	5.0	S. 80 W.	10	10	10	......	.08
.794	.794	.782	.790	N. NW.	N	NW...	5.0	6.0	3.0	4.5	N. 18 W.	10	9	1	......	.05
.860	.833	1.000	.918	NW....	S	W.NW	3.5	9.0	2.5	2.5	S. 40 W.	2	10	1	......	....
.864	.900	.816	.860	NW....	W	NW...	5.0	3.5	1.0	2.9	N. 61 W.	2	10	10	......	....
.898	.829	.820	.849	E. SE..	S. SE	W	8.5	17.0	2.0	7.5	S. 34 E..	10	10	10	......	.12
.907	.830	.744	.834	W	W.NW	NW...	5.0	6.0	2.0	4.2	N. 72 W.	10	6	8	......	....
.840	.805	.698	.781	S. SW..	SW ...	W	6.0	11.0	0.3	5.7	S. 37 W.	10	8	2	......	....
.843	.675	.592	.703	SW	SW ...	NW...	4.0	14.0	0.5	6.0	S. 47 W.	3	3	3	......	....
.831	.819	.770	.807	....	....	....	....	....	....	3.4	S. 4 W..	7.1	7.3	5.3	1.324	2.93
.698	.722	.727	.715	N	E	N	1.5	2.0	2.0	1.3	N. 30 E..	10	3	10	......	....
.677	.829	.807	.771	N	N. NE.	W.NW	2.5	1.0	3.0	1.7	N. 28 W.	10	10	10	......	....
.797	.816	.698	.770	W	N.NW.	N	5.0	7.5	0.5	3.6	N. 47 W.	8	7	8	......	.24
.807	.767	.767	.780	S	S. SW.	S. SW.	26.0	20.0	13.0	19.2	S. 13 W.	7	4	10	......	....
.912	.732	.800	.815	NW....	N	NW...	4.0	9.0	1.5	4.4	N. 17 W.	10	10	2	......	.05
.730	......	.792	.761	N. NW.	S	SE....	1.5	10.0	13.0	6.6	S. 26 E.	1	10	10	......	.11
1.000	.893	......	.946	NE	NE ...	NW...	7.5	14.0	2.0	7.2	N. 39 E..	4	8	7	......	....
.876	.807	.792	.825	NW....	SW ...	W.NW	4.0	5.0	2.0	2.7	West....	2	6	9	......	....
.746	.829	.712	.762	NW....	N	NW...	4.0	5.5	2.5	3.7	N. 24 W.	2	5	9	......	....
.893	.820	.744	.819	NW....	SE....	SE....	2.0	4.5	19.0	7.2	S. 45 E..	9	9	1	......	....
.829	.847	.777	.818	S.SW..	S	NW...	14.0	11.5	4.0	7.7	S. 21 W.	10	10	10	......	....
.900	.802	.698	.800	NW....	SW ...	W	1.0	4.0	6.0	3.3	S. 77 W.	10	10	10	......	.24
.893	.705	.719	.772	W. SW.	W	N	5.0	4.5	1.5	3.0	S. 87 W.	10	7	10	......	....
.698	.792	.876	.789	W	NW...	NW...	2.0	3.0	2.0	2.2	N. 57 W.	10	9	1	......	.04
.692	.768	.893	.784	N	E. NE.	E	4.0	22.0	20.0	14.0	N. 73 E..	6	10	4	......	....
.893	.811	.811	.838	SE	S	N	14.0	0.3	0.3	4.7	S. 45 E..	10	8	10	......	....
.811	.738	.726	.758	NW....	NW...	NW...	0.3	4.0	2.0	2.1	N. 45 W.	10	10	10	......	1.00
.726	.820	.824	.790	S. SW..	SW ...	W.NW	4.0	5.0	1.0	3.0	S. 41 W.	10	10	10	......	....
.824	.824	.732	.793	NW....	N.NW.	N	0.3	4.0	0.3	1.5	N. 22 W.	10	10	10	......	....
.895	.797	.675	.789	NW....	N	NW...	7.0	5.0	4.0	5.0	N. 31 W.	10	10	1	......	....
.584	.895	.698	.726	W.NW.	SW ...	W	4.0	4.5	2.0	3.0	S. 79 W.	1	1	2	......	....
.893	.792	.893	.859	NW....	N.NW.	N	2.0	8.0	8.0	5.8	N. 15 W.	6	10	10	......	....
.761	......	.893	.827	NW....	W	SW ...	3.0	7.5	4.5	4.3	S. 85 W.	10	8	10	......	....
.794	.807	.811	.804	SW	S. SW.	SW ...	5.0	17.5	10.0	10.5	S. 34 W.	10	10	10	......	....
.802	.807	.797	.802	W	W	W	3.0	5.5	3.5	4.0	West....	10	8	10	......	....
.830	1.000	.792	.804	NW....	N.NW.	SW ...	2.0	4.5	2.5	2.0	N. 52 W.	10	10	10	......	....
.893	.890	.890	.891	SW	S	W.NW	7.0	10.0	2.5	5.3	S. 28 W.	10	10	10	......	....
.876	.775	.893	.848	W	SW ...	SW ...	4.0	4.0	2.0	3.1	S. 63 W.	10	10	10	......	....
.887	.893	1.000	.926	N	N. NE.	NW...	0.5	1.5	2.0	1.2	N. 15 W.	10	10	9	......	....
1.000	.896	.792	.896	SW	E. NE.	N.NW.	3.0	2.5	2.0	0.3	N. 45 W.	10	10	10	......	.08
.822	.817	.794	.811	....	....	....	....	....	....	1.1	S. 52 W.	8.2	8.5	8.1	......	1.76

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.392	29.503	29.544	29.479	31	32	29	31	33	30	31.3	35	30	.174	.168	.149	.164
2	29.695	29.644	29.511	29.617	18	26	27	19	27	28	24.6	30	17	.087	.129	.136	.117
3	29.280	29.246	29.366	29.297	25	28	27	26	29	28	27.6	29	24	.123	.142	.136	.134
4	29.352	29.236	29.224	29.271	23	28	27	25	29	28	27.3	29	23	.100	.142	.136	.126
5	29.274	29.078	29.095	29.149	20	22	22	22	24	24	23.3	28	20	.085	.095	.095	.092
6	29.295	29.399	29.519	29.404	9	10	10	10	11	11	10.6	27	7	.054	.057	.057	.056
7	29.550	29.522	29.575	29.549	11	18	18	12	19	20	17.0	20	10	.061	.087	.076	.075
8	29.442	29.389	29.507	29.446	17	20	21	18	21	23	20.6	23	12	.083	.096	.090	.090
9	29.587	29.529	29.469	29.528	23	26	28	24	27	30	27.0	30	23	.112	.129	.130	.124
10	29.416	29.275	29.263	29.318	29	37	39	31	38	41	36.6	43	30	.137	.207	.212	.185
11	29.206	29.136	29.253	29.198	39	46	45	41	49	48	46.0	51	39	.212	.271	.260	.248
12	29.524	29.478	29.405	29.469	30	33	36	32	35	37	34.6	48	32	.144	.162	.199	.168
13	29.278	29.179	29.204	29.220	36	41	45	38	44	46	42.6	49	37	.186	.218	.286	.230
14	29.310	29.184	29.053	29.182	43	42	41	43	42	42	42.3	46	41	.278	.267	.244	.263
15	29.064	29.042	29.002	29.036	43	38	34	45	39	36	40.0	51	36	.251	.216	.170	.212
16	28.997	29.045	29.378	29.140	29	29	24	31	31	26	29.3	36	26	.137	.137	.106	.127
17	29.673	29.862	29.945	29.827	16	21	19	17	22	21	20.0	26	10	.078	.101	.080	.086
18	29.732	29.404	29.332	29.489	20	28	31	22	29	33	28.0	33	15	.085	.142	.151	.126
19	29.645	29.910	30.061	29.872	26	22	14	28	24	16	22.6	33	16	.117	.106	.059	.094
20	30.109	30.062	29.990	30.054	10	20	18	12	21	20	17.6	23	10	.046	.096	.076	.073
21	29.715	29.527	29.509	29.584	18	20	22	19	22	24	21.6	24	18	.087	.085	.095	.089
22	29.427	29.328	29.411	29.389	27	36	33	28	38	35	33.6	38	24	.136	.186	.162	.161
23	29.616	29.626	29.604	29.635	29	30	30	31	31	32	31.3	35	31	.137	.155	.144	.145
24	29.531	29.251	29.245	29.342	32	33	41	33	35	43	37.0	43	32	.168	.162	.231	.187
25	29.283	29.180	29.241	29.235	38	40	35	41	43	38	40.6	44	38	.190	.208	.165	.188
26	29.106	28.951	29.045	29.034	31	35	34	32	37	36	35.0	38	31	.162	.178	.170	.170
27	29.217	29.189	29.198	29.201	31	33	33	33	35	35	34.3	36	33	.151	.162	.162	.158
28	29.160	29.089	29.029	29.093	31	32	33	33	33	35	33.6	35	32	.151	.168	.162	.160
29	29.252	29.367	29.429	29.349	35	34	32	37	36	34	35.6	37	34	.178	.170	.155	.168
30	29.495	29.422	29.508	29.475	26	26	25	28	27	26	27.0	34	26	.117	.129	.123	.123
31	29.605	29.617	29.649	29.624	24	28	28	25	29	29	27.6	32	23	.117	.142	.142	.134
Means....	29.431	29.376	29.407	29.405	26.4	29.4	29.1	27.9	31.2	30.8	29.9	....	....	.134	.152	.150	.145
1863.																	
Jan. 1	29.645	29.482	29.402	29.509	24	....	32	25	30	34	29.6	34	24	.117	....	.155	.136
2	29.297	29.109	29.159	29.188	31	36	38	33	37	40	37.3	40	34	.183	.199	.203	.195
3	29.224	29.129	29.084	29.146	38	38	37	40	39	39	39.3	41	39	.203	.216	.194	.204
4	28.635	28.722	28.989	28.782	40	39	34	40	40	35	38.3	40	35	.248	.225	.183	.219
5	28.965	28.989	28.959	28.971	32	36	35	34	37	36	35.6	37	33	.155	.199	.191	.181
6	29.025	29.075	29.253	29.118	28	25	21	29	26	22	25.6	36	22	.142	.123	.101	.122
7	29.527	29.575	29.627	29.576	16	19	19	17	20	21	19.3	22	16	.078	.092	.080	.083
8	29.655	29.604	29.657	29.638	19	20	20	20	21	21	20.6	22	19	.092	.096	.096	.094
9	29.695	29.602	29.446	29.581	20	25	29	21	26	30	25.6	30	20	.096	.123	.149	.123
10	28.960	28.782	28.944	28.895	32	33	30	32	34	31	32.3	34	30	.181	.175	.155	.170
11	29.040	29.167	29.452	29.219	25	24	24	26	25	25	25.3	31	25	.123	.117	.117	.119
12	29.442	29.409	29.622	29.491	22	29	30	23	30	31	28.0	32	21	.107	.149	.115	.123
13	29.677	29.339	29.099	29.371	28	31	32	29	32	33	31.3	33	28	.142	.162	.168	.157
14	29.005	28.997	29.033	29.012	37	33	28	39	34	29	34.3	41	29	.194	.175	.142	.170
15	29.202	29.128	29.105	29.145	20	20	18	21	21	19	20.3	29	19	.096	.096	.087	.093
16	29.051	29.134	29.379	29.188	11	8	1	12	10	3	8.3	19	3	.061	.040	.023	.041
17	29.701	29.804	29.876	29.793	–.12	6	14	–.11	7	15	3.6	15	–.11	.013	.046	.071	.043
18	29.936	29.800	29.802	29.846	13	20	23	14	21	24	19.6	24	13	.067	.096	.112	.092
19	29.812	29.798	29.772	29.794	16	24	26	17	25	28	23.3	28	17	.078	.117	.117	.104
20	29.638	29.545	29.505	29.569	29	31	31	30	32	32	31.3	32	27	.149	.162	.162	.158
21	29.515	29.534	29.589	29.546	32	34	33	32	36	35	34.3	36	31	.181	.170	.162	.171
22	29.512	29.374	29.439	29.452	32	33	33	34	34	34	34.0	35	34	.155	.175	.175	.168
23	29.557	29.574	29.545	29.558	32	63	32	34	35	33	34.0	35	33	.155	.162	.155	.157
24	29.302	29.279	29.442	29.341	33	35	34	34	36	35	35.0	36	33	.175	.191	.183	.186
25	29.617	29.554	29.596	29.589	32	39	34	33	40	36	36.3	43	33	.168	.225	.186	.193
26	29.480	29.346	29.352	29.392	29	34	33	31	35	35	33.6	36	31	.137	.188	.162	.163
27	29.340	29.370	29.435	29.381	28	29	28	29	30	29	29.3	35	29	.142	.149	.142	.144
28	29.441	29.305	29.263	29.336	18	26	27	18	26	28	24.0	33	17	.098	.141	.136	.135
29	29.069	28.942	28.960	28.990	21	27	29	22	27	30	26.3	30	21	.101	.147	.149	.132
30	29.053	29.241	29.338	29.210	29	....	28	29	31	29	29.6	31	29	.160	....	.142	.151
31	29.241	29.203	29.343	29.262	26	30	27	27	31	28	28.6	32	26	.129	.155	.136	.140
Means...	29.364	29.319	29.369	29.351	25.2	28.2	27.8	26.0	29.3	29.0	28.1	....	....	.133	.152	.140	.142

of the north and northwestern lakes, at Tawas City, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.			
											°						
1.000	.893	.890	.928	W	NW	NW	2.5	7.0	4.0	4.3	N. 53 W.	8	7	1	......	....
.845	.880	.883	.869	W.NW	S.SW	S.SW	1.0	7.5	9.0	5.3	S. 26 W.	10	9	10	......	....
.876	.887	.883	.883	W	W	W	1.0	5.0	3.0	3.0	West	7	10	10	......	....
.746	.887	.883	.839	W	W	W	2.0	3.0	3.0	2.7	West	2	10	10	......	....
.721	.738	.738	.732	SW	SW	N	4.0	7.5	9.0	2.7	N. 84 W.	10	10	5	......	....
.791	.797	.797	.795	NW	NW	NW	4.0	13.0	4.5	7.2	N. 45 W.	2	5	10	......	....
.804	.845	.702	.783	W	W.SW	W.SW	3.0	6.0	5.5	4.7	S. 72 W.	10	10	9	......	....
.840	.855	.730	.808	S.SW	S	N	12.0	5.5	1.0	5.3	S. 16 W.	10	9	10	......	....
.868	.880	.782	.843	W	SW	SW	4.0	6.5	6.0	5.2	S. 56 W.	10	10	2	......	....
.788	.905	.824	.839	SW	S	SW	4.0	9.0	8.0	6.3	S. 26 W.	4	3	1	......	....
.824	.781	.777	.794	SW	S.SW	SW	8.0	16.5	8.5	10.8	S. 34 W.	7	9	3	......	....
.794	.797	.903	.831	NW	E	NE	0.3	12.0	6.0	5.7	N. 75 E.	9	10	10	......	....
.811	.756	.921	.829	S.SE	S.SW	SW	6.0	10.5	6.0	6.7	S. 17 W.	10	10	8	......	.24
1.000	1.000	.914	.971	SW	NE	S	1.0	1.0	9.0	3.0	South	10	10	10	......	.04
.840	.907	.802	.850	W	SW	W.NW	0.5	2.0	5.0	2.2	N. 85 W.	9	10	10	......	.06
.788	.788	.754	.776	W.SW	NW	NW	3.0	6.0	4.0	3.8	N. 59 W.	9	8	1	......	....
.834	.860	.712	.802	NW	NW	NW	5.0	6.0	1.5	4.2	N. 45 W.	8	2	1	......	....
.721	.887	.800	.803	S	S	S.SW	13.0	30.0	12.0	18.2	S. 5 W.	7	6	1	......	....
.768	.754	.659	.727	N.NW	N.NW	NW	8.0	6.0	0.5	4.8	N. 23 W.	6	2	2	......	....
.610	.855	.702	.722	NW	S	S.SW	4.0	13.0	13.5	8.0	S. 19 W.	5	5	4	......	....
.845	.721	.738	.768	SW	S.SW	W	17.0	9.0	8.0	10.3	S. 49 W.	10	10	10	......	....
.883	.811	.797	.830	SW	W	W	7.5	9.0	0.3	5.2	S. 69 W.	10	4	10	......	....
.788	.893	.794	.835	N	NE	E.NE	1.0	6.0	14.0	6.7	N. 59 E.	10	10	10	......	....
.893	.797	.833	.841	S.SE	S.SW	SW	8.0	5.0	10.0	6.7	S. 17 W.	10	9	3	......	.02
.738	.750	.719	.732	W.SW	SW	W.NW	8.0	6.0	2.5	5.0	S. 65 W.	2	10	8	......	....
.896	.807	.802	.835	N.NE	N.NE	N	1.5	3.0	2.0	2.2	N. 15 E.	10	10	10	......	....
.800	.797	.797	.798	W.SW	S.SW	S.SW	1.0	4.0	0.3	1.6	S. 30 W.	10	10	10	......	.38
.800	.893	.797	.830	SW	S.SW	S	1.0	7.0	9.0	5.5	S. 12 W.	2	10	3	......	....
.807	.802	.792	.800	W	NW	N.NW	1.0	4.0	1.0	1.9	N. 49 W.	5	10	10	......	....
.768	.880	.876	.805	N	N.NE	N.NW	3.0	4.0	4.5	3.6	N. 1 W.	5	10	10	......	....
.872	.887	.887	.883	W.NW	W.SW	S.SW	1.5	4.0	8.0	3.9	S. 44 W.	8	1	7	......	....
.818	.838	.802	.819	......	......	......	....	....	....	2.9	S. 48 W.	7.6	8.0	6.7	......	.74
.872	......	.792	.832	SW	S.SW	S.SW	6.0	19.0	19.0	13.0	S. 26 W.	7	9	10	......	....
.898	.903	.820	.873	S	S	S.SW	12.5	21.0	21.0	16.5	S. 10 W.	10	10	7	......	....
.820	.907	.816	.848	S	NE	S.SW	3.0	2.0	2.0	1.2	S. 10 E.	10	10	10	......	.03
1.000	.910	.898	.936	S.SW	W.NW	W.SW	5.0	6.0	6.0	5.9	S. 81 W.	10	10	3	......	.27
.792	.903	.900	.865	SW	S	SW	6.0	3.0	3.0	5.8	S. 21 W.	8	10	10	......	.48
.887	.876	.860	.874	W.SW	W	NW	2.0	5.0	5.0	4.7	N. 79 W.	9	7	5	......	.09
.834	.850	.712	.798	N	W	W	7.0	1.0	1.0	2.5	N. 23 W.	4	10	10	......	....
.850	.855	.855	.853	W.SW	S.SW	NW	2.0	1.5	1.5	2.8	S. 41 W.	10	10	5	......	....
.855	.876	.890	.874	W.NW	S	S.SE	2.0	16.0	16.0	8.3	S. 10 E.	10	10	10	......	....
1.000	.895	.893	.933	SE	SW	W.SW	6.0	9.0	9.0	5.5	S. 35 E.	10	10	10	......	....
.876	.872	.872	.873	W	NW	N	4.0	3.0	3.0	3.4	N. 49 W.	10	10	10	......	.28
.864	.890	.893	.882	W.SW	SW	N.NE	0.5	0.5	0.5	0.8	S. 51 W.	10	9	10	......	....
.887	.896	.893	.892	E	E.SE	SE	21.0	3.0	3.0	14.0	S. 77 E.	10	10	10	......	....
.816	.895	.887	.866	SW	W.SW	NW	13.0	4.5	4.5	6.6	S. 65 W.	10	10	10	......	.22
.855	.855	.845	.852	W.NW	N	N	0.5	4.0	4.0	3.6	N. 2 W.	10	10	10	......	....
.804	.582	.460	.615	N	N.NW	W	7.5	1.5	1.5	6.5	N. 18 W.	10	10	1	......	....
.519	.769	.823	.703	NW	SW	S	2.0	24.0	24.0	9.1	S. 12 W.	9	10	2	......	....
.816	.855	.868	.846	S	S	S.SW	26.0	14.0	14.0	22.3	S. 5 W.	7	4	10	......	....
.834	.872	.768	.824	NW	S	N.NW	1.5	0.5	0.5	1.9	S. 12 W.	6	10	10	......	....
.890	.869	.896	.894	E.NE	E.NE	E	11.0	15.0	15.0	13.3	N. 76 E.	10	10	10	......	....
1.000	.802	.797	.866	NE	W	SW	0.3	1.5	1.5	0.7	S. 67 W.	10	10	10	......	.26
.792	1.000	.895	.861	S	SW	S.SW	8.0	2.0	2.0	4.3	S. 16 W.	10	10	10	......	....
.792	.797	.792	.794	NW	NE	E	0.3	14.0	14.0	11.5	N. 62 E.	10	10	10	......	....
.895	.900	.898	.897	S	S.SW	SW	10.0	7.5	7.5	9.2	S. 21 W.	10	10	10	......	.29
.893	.910	.811	.871	W	SW	W	5.5	2.0	2.0	5.0	S. 69 W.	10	1	1	......	.02
.788	.898	.797	.817	NW	N.NE	N	0.5	6.0	6.0	3.7	N. 9 E.	10	10	10	......	....
.887	.890	.887	.888	NW	N	N.NW	8.0	0.5	0.5	5.7	N. 19 W.	10	10	1	......	....
1.000	1.000	.883	.961	NW	S.SE	W.SW	0.3	0.5	0.5	5.7	S. 21 E.	10	7	1	......	....
.860	1.000	.890	.916	W.SW	S	SW	3.0	1.5	1.5	3.1	S. 24 W.	2	10	10	......	....
1.000	......	.887	.943	W	NW	W	3.0	8.0	8.0	4.7	N. 79 W.	10	10	10	......	.12
.880	.893	.883	.885	SW	W.SW	N.NE	6.0	5.5	5.5	3.3	N. 43 W.	2	10	9	......	....
.863	.877	.840	.862	......	......	......	....	....	....	2.6	S. 15 W.	8.8	9.2	8.0	......	2.06

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	29.055	28.715	28.838	28.869	29	32	25	30	32	27	29.7	30	25	.149	.181	.112	.147
2	29.408	29.463	29.563	29.478	8	10	3	9	11	5	8.3	27	5	.051	.057	.027	.045
3	29.642	29.743	29.919	29.768	....	7	2	7	7	3	1.0	8	7	...	.059	.036	.048
4	30.017	29.973	29.947	29.979	12	8	....	11	8	12	3.0	12	11	.013	.062	....	.038
5	29.617	29.443	29.436	29.498	14	18	21	15	19	22	18.7	22	12	.071	.087	.101	.086
6	29.339	29.335	29.430	29.368	21	26	25	22	27	27	25.3	29	22	.101	.129	.112	.114
7	29.433	29.412	29.580	29.475	20	29	27	21	30	29	26.7	33	21	.096	.149	.124	.123
8	29.768	29.864	29.838	29.823	22	24	21	23	25	22	23.3	29	22	.107	.117	.101	.108
9	29.656	29.210	29.105	29.323	24	....	32	24	30	34	2[illegible].3	34	23	.129	....	.155	.142
10	29.573	29.672	29.720	29.655	23	26	27	25	28	29	27.3	34	25	.100	.117	.124	.114
11	29.233	29.434	29.445	29.504	22	28	29	23	30	31	28.0	34	23	.107	.130	.137	.125
12	29.428	29.443	29.619	29.496	23	21	18	25	22	19	22.0	31	19	.100	.101	.087	.096
13	29 718	29.756	29.761	29.745	2	19	20	3	20	22	15.0	23	2	.036	.092	.085	.071
14	29.523	29.085	28.900	29.168	23	32	38	24	34	39	32.3	39	22	.112	.155	.216	.161
15	29.235	29.400	29.508	29.381	30	30	30	32	32	32	32.0	39	31	.114	.114	.114	.114
16	29.863	29.806	29.762	29.809	17	25	23	18	26	24	22.7	32	18	.083	.123	.112	.106
17	29.604	29.532	29.432	29.529	22	32	32	23	32	34	29.7	38	23	.107	.181	.155	.148
18	29.376	29.219	29.212	29.270	21	35	35	23	37	37	32.3	40	23	.090	.178	.178	.149
19	29.142	28.965	28.957	29.021	34	34	34	35	36	36	35.7	37	35	.183	.170	.170	.174
20	29.185	29.385	29.656	29.409	31	28	20	33	29	22	28.0	36	22	.151	.142	.085	.126
21	29.860	29.967	29.888	29.905	11	13	12	12	14	13	13.0	22	11	.061	.067	.063	.064
22	29.667	29.611	29.686	29.654	17	18	20	18	20	21	19.7	21	13	.083	.076	.096	.085
23	29.749	29.690	29.598	29.679	20	24	26	21	25	28	24.7	28	21	.096	.117	.117	.110
24	29.516	29.482	29.520	29.506	20	32	30	22	32	32	28.7	33	22	.085	.181	.114	.127
25	29.535	29.438	29.442	29.472	28	35	33	29	37	35	33.7	38	29	.142	.178	.162	.161
26	29.118	29.827	29.997	28.980	34	34	39	34	35	40	36.3	41	33	.196	.183	.225	.201
27	29.165	29.387	29.597	29.383	32	31	32	33	32	34	33.0	40	30	.162	.162	.155	.160
28	29.616	29.466	29.324	29.468	22	33	32	23	34	34	30.3	34	21	.107	.175	.155	.146
Means....	29.515	29.454	29.490	29.486	20.6	25.3	25.4	20.7	26.9	26.5	24.7	....	....	.105	.129	.123	.119
March 1	29.000	29.080	29.226	29.102	31	37	36	32	38	37	35.7	39	31	.162	.207	.199	.189
2	29.282	29.207	29.242	29.244	30	30	27	31	32	28	30.3	37	28	.155	.144	.136	.145
3	29.406	29.488	29.583	29.492	20	22	19	21	23	21	21.7	30	19	.096	.107	.080	.094
4	29.718	29.756	29.769	29.748	6	19	17	7	20	18	15.0	21	6	.046	.092	.083	.074
5	29.637	29.382	29.098	29.372	12	25	28	13	26	29	22.7	29	12	.063	.123	.142	.109
6	29.035	29.270	29.463	29.256	33	32	25	34	34	27	31.7	35	27	.175	.155	.112	.147
7	29.459	29.403	29.366	29.409	17	24	23	18	25	25	22.7	28	17	.083	.117	.100	.100
8	29.113	29.005	29.005	29.041	25	31	30	26	31	32	29.7	32	24	.123	.174	.144	.147
9	29.144	29.248	29.463	29.285	18	23	20	20	25	25	23.3	32	19	.076	.100	.084	.087
10	29.385	29.249	29.247	29.294	12	32	34	14	34	37	28.3	38	14	.052	.155	.157	.121
11	29.273	29.305	29.436	29.338	....	28	22	29	29	24	27.3	37	24	....	.142	.095	.119
12	29.540	29.538	29.624	29.567	12	19	16	13	20	19	17.3	24	11	.063	.092	.056	.070
13	29.521	29.518	29.533	29.524	7	21	20	8	23	23	18.0	23	8	.048	.090	.074	.071
14	29.379	29.253	29.302	29.311	15	28	28	15	29	30	24.7	31	15	.086	.142	.130	.119
15	29.283	29.295	29.385	29.321	....	25	25	30	27	26	27.7	30	26	....	.112	.123	.118
16	29.536	29.502	29.447	29.495	22	32	31	24	33	33	30.0	35	23	.095	.168	.151	.138
17	29.282	29.353	29.492	29.376	32	39	34	34	42	36	37.3	42	33	.155	.199	.170	.175
18	29.728	29.805	29.849	29.794	24	24	20	25	25	22	24.0	36	22	.117	.117	.085	.106
19	29.862	29.820	29.828	29.833	15	25	25	16	27	27	23.3	29	15	.074	.112	.112	.099
20	29.798	29.780	29.655	29.744	26	29	28	27	29	30	28.7	30	26	.129	.160	.130	.140
21	29.473	29.374	29.504	29.450	28	33	33	29	34	35	32.7	35	27	.142	.175	.162	.160
22	29.505	29.516	29.497	29.506	....	32	33	30	34	35	33.0	35	30	....	.155	.162	.159
23	29.370	29.300	29.250	29.307	34	34	33	36	36	35	35.7	36	35	.170	.170	.162	.167
24	28.920	28.847	29.090	29.952	35	36	35	35	38	37	37.7	39	34	.204	.186	.178	.189
25	29.063	29.029	29.137	29.076	30	36	32	32	38	35	35.0	38	31	.144	.186	.142	.157
26	29.218	29.287	29.442	29.316	24	28	29	25	29	31	28.3	35	25	.117	.142	.137	.132
27	29.486	29.417	29.342	29.415	20	32	33	21	33	35	29.7	36	21	.096	.168	.162	.142
28	29.100	29.107	29.295	29.167	31	29	22	33	31	25	29.7	35	25	.151	.137	.084	.124
29	29.405	29.524	29.702	29.544	13	30	32	14	30	34	26.0	37	14	.067	.167	.155	.130
30	29.675	29.533	29.376	29.528	19	32	34	21	34	37	30.7	37	21	.080	.155	.157	.131
31	29.127	29.222	29.428	29.259	33	31	18	35	31	21	29.0	37	21	.162	.174	.065	.134
Means....	29.378	29.368	29.421	29.389	22.2	29.0	27.2	24.1	30.3	29.3	27.9	....	....	.112	.145	.126	.127

of the north and northwestern lakes, at Tawas City, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.890	1.000	.761	.884	S	S. SW	W	13.5	9.5	19.0	10.5	S. 46 W.	10	10	10	......	....
.784	.797	.500	.694	W	NW...	W	7.0	9.0	2.0	5.7	N. 67 W.	2	7	1	......	....
......	1.000	.730	.865	W. NW.	N	N	4.0	3.5	2.5	2.8	N. 26 W.	1	9	1	......	....
.519	1.000	......	.759	NW....	SE....	SE ...	1.0	12.0	23.0	11.3	S. 45 E..	6	10	10	......	....
.823	.845	.860	.843	SE.....	E	N. NW	14.0	1.5	2.0	4.4	S. 53 E..	10	10	10	......	....
.860	.880	.761	.834	N. NW.	W. NW	W. SW	4.0	6.0	4.0	3.9	N. 67 W	10	6	1	......	.19
.855	.890	.775	.841	SW....	SW...	W	5.0	12.0	5.0	7.0	S. 55 W.	7	8	10	......	....
.864	.872	.860	.865	N	NE ...	N. NW	1.0	5.0	3.0	2.6	N. 18 E..	10	10	10	......	....
1.000	......	.792	.896	E. NE ..	E. SE.	W	26.0	12.0	7.5	9.3	N. 79 E..	10	10	1	......	....
.746	.768	.775	.763	W	W	W. NW	4.5	3.0	2.0	3.1	N. 85 W.	3	9	4	......	.50
.864	.782	.788	.811	SW ...	S	N. NW	3.0	10.5	1.5	3.8	S. 13 W.	7	7	1	......	....
.746	.860	.845	.817	N	N. NE.	N	4.5	7.5	1.5	4.3	N. 12 E..	10	9	2	......	....
.730	.850	.721	.767	NW....	E	SE....	4.0	11.0	16.0	7.0	S. 66 E..	2	2	10	......	....
.868	.792	.907	.856	SE	S. SW.	W. SW	15.5	2.0	24.0	8.3	S. 29 W.	9	10	2	......	....
.794	.794	.794	.794	W	W	W	10.0	16.0	32.0	19.3	West....	7	10	10	......	.38
.840	.876	.868	.861	NW....	S. SE.	S. SE.	0.5	7.5	16.0	7.7	S. 22 E..	8	2	1	......	....
.864	1.000	.792	.885	S. SE ..	S	S. SW.	7.5	8.0	6.5	6.3	S. 1 E..	10	6	10	......	....
.730	.807	.807	.781	W	SE....	S. SW.	0.5	0.5	9.5	3.3	S. 23 W	8	10	10	......	....
.898	.802	.802	.834	NE	NE ...	N. NE.	0.3	11.0	5.0	5.3	N. 38 E..	10	5	6	......	....
.800	.887	.721	.803	N. NW.	N. NW	N. NW	8.0	7.0	3.0	6.0	N. 23 W	10	7	10	......	....
.804	.816	.810	.810	NW....	E. NE.	NE ...	3.0	15.0	21.5	12.0	N. 49 E..	3	7	10	......	....
.840	.702	.855	.799	E. NE..	E. NE.	N	28.0	19.0	2.5	16.0	N. 65 E..	10	7	4	......	....
.855	.872	.768	.832	S. SW..	S	S	5.0	14.0	9.0	9.2	S. 4 W	9	5	9	......	....
.721	1.000	.794	.838	SW ...	S	S	1.0	15.0	4.5	6.7	S. 2 W.	6	2	1	......	....
.887	.807	.797	.830	S	S	NW...	4.0	13.0	1.0	5.4	S. 3 W.	9	2	10	......	....
1.000	.898	.910	.936	E. NE..	S. SW	SW ..	6.0	1.0	12.0	2.6	S. 26 W.	10	10	10	......	.26
.869	.896	.792	.852	W	W	NE ...	12.0	12.5	0.3	8.1	West....	8	3	10	......	.20
.864	.895	.792	.850	N. NW.	E. NE.	E	2.0	6.5	0.3	1.9	N. 54 E..	8	10	10	......	....
.819	.866	.791	.825	....	....	....	....	....	....	1.3	S. 6 W.	7.6	7.2	6.5	......	1.35
.896	.905	.903	.901	W. NW	S	NW...	2.0	6.5	0.5	1.9	S. 21 W.	10	6	10	......	....
.893	.791	.883	.857	N	NE ...	NE ...	1.0	18.0	13.0	10.5	N. 44 E..	10	10	10	......	.06
.855	.864	.712	.810	N	W. NW	N. NW	5.0	4.0	2.0	3.2	N. 28 W.	10	5	1	......	.21
.769	.850	.840	.820	NW....	E	S. SE.	3.5	11.0	9.5	4.6	S. 63 E..	2	5	0	......	....
.810	.876	.887	.858	S. SW.	S	S. SW.	10.0	25.0	14.0	16.0	S. 11 W.	10	10	10	......	....
.895	.792	.761	.816	W	W	NW...	10.0	10.5	0.3	6.9	West....	10	2	3	......	....
.840	.872	.746	.819	NW....	NE ...	E. NE.	3.0	13.0	16.0	9.3	N. 51 E..	10	10	4	......	....
.876	1.000	.794	.890	S	S. SW.	SW ..	14.0	12.0	6.0	10.2	S. 16 W.	10	10	3	......	....
.702	.746	.622	.690	SW	W. NW	SW ...	10.0	12.0	4.0	7.3	S. 76 W.	2	3	3	......	....
.635	.792	.712	.716	W. SW	S. SW.	SW ..	1.0	23.5	4.0	9.3	S. 27 W.	1	6	0	......	....
......	.887	.738	.813	NW....	NW ...	NW ..	7.0	6.0	3.0	5.3	N. 45 W.	10	8	2	......	.06
.810	.850	.541	.734	NW....	NW...	W	2.0	6.0	2.0	3.2	N. 54 W.	10	10	1	......	....
.777	.730	.598	.702	W. NW	NW...	NW ..	6.0	9.0	1.0	5.2	N. 53 W.	2	7	1	......	....
1.000	.887	.782	.890	W	S	SE ...	5.0	22.0	6.0	8.7	S. 2 W.	10	10	10	......	....
......	.761	.876	.819	SE	E	N	18.0	16.0	2.0	10.2	S. 69 E..	10	10	10	......	....
.738	.893	.800	.810	NW....	S	S	4.0	13.5	0.3	3.8	S. 14 W.	9	1	8	......	....
.792	.744	.802	.779	SW....	E. NE.	N. NE.	2.5	12.5	6.0	5.0	S. 55 E..	10	10	3	......	....
.872	.872	.721	.822	NE	E	NW...	11.0	18.0	2.0	8.7	N. 69 E..	9	1	2	......	....
.829	.761	.761	.784	NW....	E. NE.	NE ...	2.0	17.0	4.0	6.8	N. 50 E..	10	9	1	......	....
.880	1.000	.782	.887	E. SE ..	E	E. SE	15.0	24.0	20.0	19.5	S. 77 E..	10	10	10	......	....
.887	.895	.797	.860	SE.....	E. SE.	S. SW.	6.0	0.5	0.3	2.1	S. 45 E..	10	10	10	......	....
......	.792	.797	.795	NW....	NE ...	NE ...	0.3	9.5	3.0	4.2	N. 44 E..	10	10	10	......	.04
.892	.802	.797	.800	NE	E. NE.	E. NE.	16.0	15.5	9.0	13.2	N. 58 E..	10	10	10	......	.36
1.000	.811	.807	.873	W. NW	NW...	SW ..	1.5	7.0	1.0	2.8	N. 56 W.	10	10	1	......	.82
.794	.811	.698	.768	NW....	S. SE.	N	1.0	10.0	4.0	1.8	S. 35 E..	10	10	6	......	.64
.872	.887	.788	.849	NW....	NW...	W	2.0	4.0	3.5	2.9	N. 69 W.	10	10	4	......	.19
.855	.893	.797	.848	W	S	S	0.5	21.0	3.0	8.0	S. 1 W.	1	7	10	......	....
.800	.788	.622	.737	W	N. NW	NW...	0.3	8.0	10.0	6.0	N. 36 W.	10	4	9	......	....
.816	1.000	.792	.869	NW....	NW...	NW...	8.0	9.0	0.5	5.8	N. 45 W.	3	4	0	......	.13
.712	.792	.712	.739	NW....	S	S. SW.	5.0	21.0	3.0	8.0	S. 15 W.	9	8	10	......	....
.797	1.000	.570	.789	S. SE..	N	N. NW	1.0	11.0	4.0	4.7	N. 5 W.	10	10	1	......	....
.828	.883	.756	.822	....	....	....	....	....	....	1.1	S. 58 E..	8.3	7.6	5.2	......	2.51

M—Reductions of the monthly meteorological register of the survey

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	29.413	28.975	28.730	29.039	7	23	34	9	24	36	23.0	36	9	.037	.112	.170	.106
2	28.628	28.832	29.082	28.854	38	39	37	43	42	40	41.7	45	36	.190	.199	.181	.190
3	29.448	29.624	29.747	29.606	27	29	26	30	31	29	30.0	40	29	.113	.137	.106	.119
4	29.814	29.719	29.629	29.721	18	32	31	20	34	34	29.3	36	20	.076	.155	.139	.123
5	29.471	29.301	29.266	29.346	22	38	37	24	40	40	34.7	44	24	.095	.203	.181	.160
6	29.289	29.434	29.532	29.418	34	32	30	36	38	32	35.3	40	32	.170	.103	.144	.139
7	29.618	29.632	29.695	29.648	24	28	27	26	29	29	28.0	32	26	.106	.142	.124	.124
8	29.728	29.696	29.669	29.698	21	33	32	22	35	35	30.7	37	22	.101	.162	.142	.135
9	29.678	29.568	29.496	29.581	22	38	42	24	39	44	35.7	44	24	.095	.216	.241	.184
10	29.296	29.189	29.122	29.202	37	40	42	38	42	42	40.7	45	38	.207	.221	.267	.232
11	29.032	29.033	29.061	29.042	46	57	45	48	59	46	51.0	60	42	.284	.439	.286	.336
12	29.482	29.531	29.587	29.533	32	35	31	35	37	34	35.3	46	34	.142	.178	.139	.153
13	29.628	29.566	29.586	29.593	....	39	35	24	40	37	33.7	40	24	....	.225	.178	.202
14	29.580	29.504	29.446	29.510	26	40	40	27	43	42	37.3	44	26	.129	.208	.221	.186
15	29.402	29.373	29.373	29.383	34	....	45	36	40	47	41.0	50	36	.170	....	.273	.222
16	29.432	29.451	29.485	29.456	32	45	45	35	48	49	44.0	51	35	.142	.260	.247	.216
17	29.439	29.350	29.368	29.386	33	46	45	36	49	46	43.7	50	36	.149	.271	.286	.202
18	29.382	29.313	29.360	29.352	33	46	46	34	49	49	44.0	50	34	.173	.271	.271	.239
19	29.311	29.327	29.337	29.325	40	47	48	42	50	51	47.7	51	42	.221	.283	.296	.267
20	29.458	29.525	29.588	29.523	45	43	43	47	46	46	46.3	51	45	.273	.238	.238	.250
21	29.666	29.648	29.636	29.650	41	43	42	43	44	45	44.0	47	41	.231	.264	.228	.241
22	29.548	29.445	29.440	29.478	41	47	46	43	49	49	47.0	50	43	.231	.297	.271	.266
23	29.385	29.317	29.325	29.342	44	48	51	46	51	53	50.0	55	46	.262	.296	.348	.302
24	29.281	29.330	29.485	29.365	37	53	46	39	57	49	48.3	57	39	.194	.350	.271	.272
25	29.569	29.581	29.588	29.589	32	38	35	35	42	39	38.7	49	35	.142	.177	.152	.157
26	29.605	29.567	29.530	29.567	28	46	46	30	49	47	42.0	51	29	.130	.271	.297	.233
27	29.496	29.392	29.307	29.398	31	49	50	33	53	52	46.0	57	32	.151	.295	.334	.260
28	29.258	29.257	29.285	29.267	37	46	47	39	50	49	46.0	52	38	.194	.258	.297	.256
29	29.238	29.260	29.310	29.269	36	50	49	39	54	51	48.0	55	38	.173	.308	.321	.267
30	29.416	29.377	29.360	29.384	34	47	45	37	51	49	45.7	51	36	.157	.270	.247	.225
Means....	29.433	29.404	29.414	29.417	32.1	41.2	40.6	34.0	43.8	42.4	40.4	....	....	.163	.234	.229	.208
May 1	29.331	23.226	29.220	29.259	34	54	55	36	58	58	50.7	61	35	.170	.365	.393	.309
2	29.471	29.488	29.484	29.481	40	40	37	44	41	39	41.3	59	39	.195	.235	.194	.208
3	29.423	29.383	29.346	29.384	36	43	40	39	46	43	42.7	46	37	.173	.238	.208	.206
4	29.304	29.311	29.296	29.304	38	39	38	41	42	41	41.3	43	40	.190	.199	.190	.193
5	29.324	29.396	29.364	29.361	38	36	40	39	38	42	39.7	42	38	.216	.186	.221	.208
6	29.444	29.467	29.450	29.454	40	42	43	43	46	46	45.0	48	42	.208	.215	.238	.220
7	29.399	29.352	29.317	29.356	31	48	50	33	52	57	47.3	58	33	.151	.282	.268	.234
8	29.376	29.364	29.322	29.354	38	52	50	40	56	55	50.3	58	40	.203	.335	.295	.278
9	29.373	29.284	29.302	29.320	42	54	49	45	58	54	52.3	60	44	.228	.365	.282	.292
10	29.247	29.234	29.356	29.279	49	53	55	51	57	58	55.3	60	50	.321	.350	.393	.355
11	29.450	29.480	29.440	29.457	48	45	45	51	48	47	48.7	59	47	.296	.260	.273	.276
12	29.425	29.447	29.499	29.457	45	49	53	47	52	56	51.7	57	45	.273	.308	.363	.315
13	29.457	29.380	29.380	29.406	45	46	46	47	49	49	48.3	56	46	.273	.271	.271	.272
14	29.375	29.450	29.500	29.442	42	50	46	44	53	49	48.7	54	43	.241	.321	.271	.278
15	29.491	29.350	29.199	29.313	35	48	50	37	50	53	46.7	54	37	.178	.309	.321	.269
16	29.033	29.087	29.187	29.102	47	51	45	50	55	50	51.7	56	49	.283	.321	.234	.279
17	29.179	29.287	29.387	29.284	38	47	45	41	50	47	46.0	52	40	.190	.283	.273	.249
18	29.505	29.449	29.490	29.481	39	52	48	41	56	52	49.7	58	40	.212	.335	.282	.276
19	29.465	29.501	29.366	29.444	41	58	60	44	65	67	58.7	70	41	.218	.389	.425	.344
20	29.356	29.331	29.414	29.367	55	66	63	61	75	75	70.3	81	61	.354	.519	.415	.429
21	29.586	29.555	29.578	29.573	50	69	58	58	76	65	66.3	75	58	.255	.614	.389	.419
22	29.659	29.550	29.486	29.565	53	62	58	58	69	65	64.0	70	56	.336	.462	.389	.396
23	29.456	29.308	29.350	29.371	51	62	64	55	67	70	64.0	70	54	.321	.489	.516	.442
24	29.341	29.252	29.276	29.290	54	60	55	58	66	62	62.0	70	57	.365	.438	.340	.381
25	29.242	29.284	29.361	29.296	50	56	57	54	60	62	58.7	63	58	.308	.396	.399	.368
26	29.434	29.441	29.478	29.451	52	59	57	56	63	64	61.0	66	55	.335	.447	.373	.385
27	29.564	29.511	29.498	29.524	48	58	57	51	64	64	59.7	67	49	.296	.407	.373	.357
28	29.527	29.440	29.393	29.453	47	60	57	51	65	63	59.7	67	50	.270	.451	.386	.369
29	29.344	29.230	29.132	29.255	49	61	58	52	67	64	61.0	68	50	.308	.457	.403	.389
30	28.928	28.868	28.818	28.871	54	60	60	58	64	64	62.0	57	67	.365	.465	.465	.432
31	28.838	28.770	28.825	28.811	55	60	59	59	64	64	62.3	65	55	.380	.465	.433	.426
Means ...	29.372	29.338	29.339	29.348	44.6	52.9	51.5	47.8	57.1	56.1	53.8	....	....	.262	.360	.330	.317

of the north and northwestern lakes, at Tawas City, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.			
.568	.868	.802	.746	SW	S. SW	SW	5.0	10.5	4.0	9.7	S. 37° W.	10	7	8	......	.16
.738	.744	.732	.738	W.NW.	NW	NW	10.0	12.0	1.0	7.5	N. 53 W.	9	6	4	......	....
.675	.788	.655	.706	N	E. NE.	NW	17.5	23.0	1.0	11.3	N. 37 E.	10	2	1	......	....
.702	.792	.712	.735	W	S. SE	NE	0.5	8.0	3.0	2.3	S. 42 E.	0	0	0	......	....
.738	.820	.732	.763	NW	S. SW.	NE	0.3	8.0	0.5	2.5	S. 24 W.	1	1	10	......	....
.802	.450	.794	.682	N	N	N	6.0	10.0	4.0	6.7	North	10	10	1	......	....
.754	.887	.775	.805	NW	E.NE	NW	3.5	23.0	0.3	7.3	N. 58 E.	8	4	1	......	.23
.860	.797	.698	.785	W.NW.	E.NE	N	3.0	9.0	1.0	2.6	N. 45 E.	4	2	1	......	....
.738	.907	.836	.827	SW	S	S	0.3	17.5	13.5	10.4	South	0	2	2	......	....
.905	.829	1.000	.911	S.SE	S	W	0.5	4.0	0.3	1.4	S. 3 W.	10	10	8	......	.04
.850	.877	.921	.883	SW	W.SW	SE	5.0	2.5	2.0	2.4	S. 37 W.	7	10	10	......	.36
.698	.807	.712	.739	N	E. NE.	N.NW.	5.0	14.0	1.0	5.7	N. 48 E.	8	2	1	......	.49
......	.910	.807	.859	NW	SE	SE	0.5	4.5	3.0	2.3	S. 45 E.	0	1	1	......	....
.880	.750	.829	.820	N	E	NE	1.5	14.0	2.0	5.2	N. 79 E.	4	6	4	......	....
.802	......	.847	.830	NE	E	N	1.0	9.5	1.0	3.5	N. 81 E.	9	9	3	......	....
.698	.777	.710	.728	N	E	NE	2.0	8.0	1.0	3.0	N. 73 E.	6	3	1	......	....
.705	.781	.921	.802	NW	SE	NE	0.3	8.0	0.3	2.6	S. 47 E.	2	1	1	......	....
.895	.781	.781	.832	S. SE	E. NE.	NE	4.0	6.5	4.0	3.5	N. 81 E.	1	3	1	......	....
.829	.786	.790	.802	E.NE	NE	N	12.0	15.0	2.0	9.2	N. 51 E.	4	10	10	......	....
.847	.767	.767	.790	N	E. NE.	NE	3.5	3.0	3.0	2.8	N. 36 E.	10	10	10	......	.44
.833	.918	.762	.838	NE	E. NE.	NE	12.0	23.0	8.0	14.0	N. 57 E.	10	10	10	......	.04
.823	.853	.781	.822	NE	E. NE	NW	16.0	15.5	3.0	10.2	N. 50 E.	9	9	9	......	.16
.843	.790	.864	.832	N	NE	NW	2.0	13.0	3.0	5.0	N. 28 E.	9	4	0	......	....
.816	.752	.781	.783	NW	E.NE	N	3.0	22.0	2.0	7.4	N. 56 E.	4	4	0	......	....
.698	.661	.636	.665	N	E	NW	4.0	19.0	2.0	6.1	N. 73 E.	4	0	0	......	....
.782	.781	.928	.862	W. NW	SE	N	2.5	3.0	2.0	0.2	N. 14 W.	1	1	1	......	....
.800	.733	.861	.798	N	S	NW	0.3	5.0	3.0	1.1	S. 39 E.	8	4	2	......	....
.816	.716	.853	.795	NE	NE	N	0.5	12.5	4.0	5.3	N. 35 E.	9	8	7	......	....
.726	.738	.859	.774	N. NE.	E.NE	NW	4.0	17.0	3.0	6.5	N. 51 E.	7	2	0	......	....
.712	.722	.710	.715	NW	E	N	1.0	12.0	0.3	3.8	N. 85 E.	0	1	0	......	....
.749	.785	.788	.774	....	....	....	....	....	....	3.0	N. 61 E.	5.8	4.7	3.6	......	1.92
.802	.756	.816	.791	W.NW.	SW	W	5.0	13.0	3.0	6.1	S. 66 W.	0	1	0	......	....
.677	.912	.816	.802	NE	N. NE	N	16.0	11.0	4.0	10.0	N. 31 E.	10	9	7	.210	....
.726	.767	.750	.748	NE	E. NE.	NE	9.0	16.0	6.0	10.2	N. 57 E.	8	10	10	.062	....
.738	.744	.738	.740	NE	NE	NE	22.0	21.0	26.0	23.0	N. 45 E.	10	10	10	.052	.25
.907	.811	.829	.849	NE	NE	NE	24.0	21.0	23.0	22.7	N. 45 E.	10	10	10	.011	.42
.750	.691	.767	.736	NE	NE	NW	16.0	23.0	3.0	13.0	N. 41 E.	10	9	1	.152	....
.800	.727	.577	.701	NW	NE	NW	2.0	12.0	2.0	4.2	N. 27 E.	1	1	1	.095	....
.820	.747	.681	.749	SW	NE	NW	0.3	4.0	2.0	1.4	N. 17 E.	6	1	1	.242	....
.762	.756	.674	.731	E	S	NE	0.5	4.0	2.0	1.1	S. 37 E.	10	4	10	.138	....
.859	.752	.816	.809	S	S. SW.	NE	2.0	6.0	1.0	2.3	S. 14 W.	10	9	10	.142	....
.790	.777	.847	.805	NE	NE	E.NE	6.0	3.0	4.0	4.2	N. 52 E.	10	10	10	......	.82
.847	.794	.809	.817	N.NW	SE	N	2.0	8.0	2.0	1.8	S. 69 E.	10	8	1	.045	.44
.847	.781	.781	.803	S.SW	NE	NW	8.5	9.0	1.0	0.8	S. 74 E.	10	10	9	.064	....
.836	.798	.781	.805	N	E	N	6.0	10.0	3.0	4.5	N. 48 E.	3	9	3	......	.08
.807	.856	.798	.820	W.NW.	S	E.SE	5.0	19.0	9.0	7.0	S. 10 E.	0	8	10	.121	....
.786	.743	.646	.725	W.NW.	W.NW	SW	8.0	11.0	2.0	6.7	N. 73 W.	2	8	0	......	.34
.738	.786	.847	.790	W.NW	E. NE.	NW	6.0	19.0	4.0	4.1	N. 50 E.	10	9	1	.150	....
.824	.747	.727	.766	W.NW.	S	NW	3.0	12.0	1.5	3.5	S. 21 W.	8	5	1	.008	.02
.756	.631	.642	.676	W	SW	SW	7.0	9.0	8.0	7.7	S. 57 W.	3	8	9	.139	....
.659	.599	.479	.579	SW	SW	W. SW	11.0	13.5	4.0	9.4	S. 49 W.	6	1	0	.317	....
.529	.685	.631	.615	S	S. SW.	S	4.0	13.0	3.0	6.6	S. 15 W.	3	0	0	.329	....
.698	.653	.631	.661	E.SE	S	NW	0.3	5.5	3.0	1.3	S. 29 W.	0	1	0	.127	....
.743	.740	.704	.729	E.NE	E	SW	2.0	3.5	4.0	1.1	S. 51 E.	8	0	6	.225	....
.756	.685	.612	.684	S.SE	E.NE	N	1.5	8.0	1.0	2.7	N. 68 E.	0	7	2	.257	....
.738	.765	.718	.737	NE	E.NE	S	3.0	7.0	4.0	2.8	N. 84 E.	8	8	8	.142	....
.747	.776	.625	.716	E. NE.	E.NE	E.NE	6.5	11.0	19.0	12.0	N. 66 E.	4	6	0	.085	....
.790	.675	.625	.667	NE	E.NE	NW	7.5	8.0	1.0	5.0	N. 53 E.	0	0	0	.188	....
.722	.731	.670	.708	E. NE.	SE	NW	0.3	3.0	1.0	0.7	S. 51 E.	8	7	4	.212	....
.794	.690	.675	.720	SE	E.SE	E	0.3	1.5	1.0	0.9	S. 75 E.	7	9	10	.141	....
.756	.780	.780	.772	N	NE	NW	1.0	4.0	6.0	2.7	N. 10 W.	10	10	10	.096	.08
.761	.780	.727	.756	SW	S. SW.	S. SW.	1.0	4.0	4.0	2.9	S. 52 W.	10	9	10	.025	.39
.770	.746	.713	.742	....	....	....	....	....	....	2.5	N. 55 W.	6.2	6.3	4.9	3.775	2.84

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
June 1	28.720	28.819	28.911	28.820	51	48	46	55	52	50	52.3	64	50	.321	.292	.258	.287
2	29.083	29.159	29.273	29.172	46	53	50	49	55	54	52.7	59	47	.271	.376	.308	.318
3	29.403	29.364	29.385	29.384	41	50	48	44	54	52	50.0	56	43	.218	.308	.282	.269
4	29.308	29.264	29.320	29.297	43	55	52	45	57	56	52.7	59	43	.251	.407	.335	.331
5	29.307	29.382	29.532	29.407	49	49	47	52	52	51	51.7	58	50	.308	.308	.270	.295
6	29.570	29.642	29.682	29.631	39	47	47	41	50	50	47.0	53	49	.212	.283	.283	.259
7	29.675	29.666	29.620	29.654	42	49	49	44	52	52	49.3	55	43	.241	.308	.308	.286
8	29.625	29.561	29.535	29.574	42	56	55	45	60	59	54.7	61	42	.228	.396	.380	.335
9	29.520	29.435	29.394	29.450	47	60	55	50	65	61	58.7	66	48	.283	.451	.354	.363
10	29.362	29.250	29.273	29.295	46	62	63	49	66	68	61.0	69	48	.271	.502	.509	.427
11	29.238	29.245	29.294	29.259	51	59	56	56	63	62	60.3	69	53	.308	.447	.383	.379
12	29.406	29.398	29.456	29.420	51	61	60	53	65	63	60.3	66	51	.348	.483	.478	.436
13	29.518	29.491	29.501	29.503	51	63	64	53	67	69	63.0	72	51	.348	.522	.529	.466
14	29.485	29.427	29.367	29.426	57	69	70	60	74	76	70.0	76	58	.426	.641	.652	.573
15	29.357	29.393	29.535	29.428	65	65	56	70	73	63	68.7	76	63	.550	.510	.369	.476
16	29.620	29.474	29.287	29.460	48	56	54	53	59	59	57.0	69	51	.269	.409	.351	.343
17	29.083	29.111	29.163	29.119	62	63	60	65	68	67	66.7	73	55	.516	.509	.425	.483
18	29.131	29.000	29.038	29.056	51	62	61	55	68	68	63.7	70	54	.321	.476	.443	.413
19	29.108	29.105	29.152	29.122	49	60	55	54	64	61	59.7	69	53	.282	.465	.354	.367
20	29.087	29.118	29.216	29.140	52	56	55	55	61	60	58.7	63	56	.349	.383	.367	.366
21	29.174	29.171	29.270	29.205	49	56	54	53	60	58	57.0	61	51	.295	.396	.365	.352
22	29.222	29.291	29.402	29.305	49	57	55	52	60	60	57.3	62	51	.308	.426	.367	.367
23	29.252	29.479	29.536	29.422	58	53	50	50	55	56	53.7	60	49	.456	.376	.282	.338
24	29.562	29.413	29.519	29.498	....	58	57	51	61	62	58.0	64	48	....	.443	.399	.421
25	29.530	29.475	29.453	29.486	47	65	60	49	67	66	60.7	69	47	.297	.591	.438	.442
26	29.506	29.470	29.450	29.475	49	66	60	51	70	67	62.7	72	50	.321	.586	.425	.444
27	29.473	29.445	29.401	29.440	55	67	60	58	71	65	64.7	73	67	.393	.608	.451	.484
28	29.393	29.300	29.253	29.315	57	69	68	60	73	73	68.7	75	59	.426	.655	.618	.566
29	29.190	29.130	29.105	29.142	67	69	70	71	74	75	73.3	76	70	.608	.641	.666	.638
30	29.158	29.182	29.263	29.201	63	68	67	68	73	72	71.0	76	67	.509	.618	.595	.574
Means....	29.335	29.322	29.353	29.337	51.0	59.0	56.8	53.7	62.9	62.1	59.6	....	....	.342	.460	.408	.403

of the north and northwestern lakes, at Tawas City, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.743	.727	.716	.729	W. SW.	W. SW	W	14.5	16.0	13.0	14.2	° S. 74 W.	8	10	10	.078	.43
.781	.869	.738	.796	W	W	NW...	4.5	5.0	5.0	4.5	N. 75 W.	6	9	3	.135	.06
.756	.738	.727	.740	NW....	S.SE..	N	1.0	10.0	0.3	2.9	S. 21 E..	6	4	10	.120	....
.840	.874	.747	.822	SW....	NW...	N	8.5	2.0	0.5	2.8	S. 61 W.	10	10	10	......	....
.794	.794	.722	.770	N	SE....	NW...	1.5	8.0	1.0	2.0	S. 55 E..	10	7	5	.107	.22
.824	.786	.786	.799	N	E	NW...	6.0	13.0	2.0	4.6	N. 57 E..	3	7	8	.160	....
.836	.794	.794	.808	NW....	E. SE	W.NW	2.0	10.0	3.0	1.7	S. 75 E..	1	3	0	.124	....
.762	.765	.761	.763	W	S.SE..	NW...	5.5	8.0	3.0	2.3	S. 40 W.	0	4	0	.155	....
.786	.731	.659	.725	W.NW.	S.SE..	NW...	5.5	2.0	2.0	2.0	N. 73 W.	0	0	1	.182	....
.781	.786	.743	.770	S.SW..	S.SW.	W	2.0	9.5	1.0	4.0	S. 28 W.	2	10	10	.183	....
.687	.776	.713	.725	NE	S	W	1.0	2.5	0.3	0.7	S. 13 E..	10	9	7	.107	....
.864	.783	.831	.826	NE	SE....	NW...	3.0	5.5	2.0	1.5	S. 86 E..	2	4	2	.123	....
.864	.790	.747	.800	E	SE....	W	1.0	8.0	1.0	2.7	S. 45 E..	2	5	8	.165	....
.822	.764	.727	.704	SW....	S. SW.	W	1.0	16.0	8.0	7.2	S. 43 W.	7	7	0	.286	....
.751	.629	.665	.682	NW....	E.NE.	NW...	3.5	15.0	1.0	4.7	N. 51 E..	2	0	1	.261	....
.667	.819	.703	.730	E	E	NW...	9.5	12.0	1.5	6.8	N. 87 E..	8	9	0	.197	....
.836	.743	.642	.740	W	SE....	NW...	4.0	5.0	2.0	0.9	S. 42 W.	2	6	10	.184	....
.743	.695	.647	.695	NW....	S	NW...	1.5	21.0	0.3	6.6	S. 4 W.	10	7	8	.189	....
.674	.780	.659	.704	W	SE....	NW...	2.5	9.5	1.0	2.3	S. 30 E..	8	9	7	.104	....
.805	.713	.708	.742	SW....	S.SW.	NW...	6.0	18.0	0.3	7.7	S. 29 W.	10	10	6	.116	....
.733	.765	.756	.751	W	S	NW...	4.0	15.0	0.5	5.1	S. 16 W.	10	10	5	007	....
.794	.822	.708	.775	N	E. SE.	W	2.0	6.5	1.0	1.7	S. 84 E..	10	10	2	.081	.08
.880	.869	.627	.792	NW....	W	NE ...	0.5	2.0	0.3	0.7	N. 76 W.	10	10	9	.029	.13
......	.825	.718	.772	E	E. SE.	NW...	0.3	9.0	1.0	2.8	S. 71 E..	8	2	0	.170	.05
.853	.893	.685	.810	W	S	NW...	7.5	4.5	0.3	2.9	S. 61 W.	0	1	0	.199	....
.859	.799	.642	.763	N	E	SE....	2.0	4.0	0.3	1.5	N. 67 E..	0	0	1	.180	....
.816	.802	.731	.783	E	E	NE ...	0.5	10.5	2.0	4.2	N. 83 E..	3	4	0	.182	....
.822	.807	.761	.830	E	E.NE.	NW...	0.3	2.5	0.3	0.9	N. 65 E..	6	5	9	.180	....
.802	.764	.768	.778	SE.....	S	W	6.5	2.0	1.0	2.5	S. 28 E..	9	9	10	.128	....
.743	.761	.758	.754	SW....	SE....	NE ...	2.9	3.0	2.0	1.0	S. 45 E..	10	6	10	......	.20
.783	.779	.719	.760	....	....	....	....	....	....	1.3	S. 6 W..	5.7	6.2	5.1	4.132	1.19

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°						
August 1	29.468	29.431	29.430	29.443	64	67	66	70	83	74	75.7	85	60	.516	.447	.523	.495
2	29.448	29.475	29.550	29.491	62	68	68	68	80	73	73.7	82	64	.476	.524	.618	.539
3	29.285	29.221	29.212	29.239	69	70	69	74	87	78	79.7	89	60	.641	.504	.588	.578
4	29.267	29.285	29.354	29.302	72	75	67	77	85	69	77.0	87	68	.718	.733	.635	.695
5	29.339	29.349	29.459	29.382	68	70	65	71	79	69	73.0	83	65	.644	.612	.564	.607
6	29.528	29.497	29.513	29.513	60	63	68	65	78	72	71.7	80	61	.451	.375	.631	.486
7	29.470	29.398	29.357	29.408	72	78	75	77	90	81	82.7	91	70	.718	.796	.787	.767
8	29.347	29.225	29.197	29.256	75	76	75	79	89	81	83.0	91	71	.814	.721	.787	.774
9	29.170	29.180	29.189	29.180	71	74	68	76	85	71	77.3	85	71	.691	.691	.644	.675
10	29.348	29.316	29.324	29.329	65	69	68	72	80	73	75.0	83	64	.524	.561	.618	.568
11	29.290	29.188	29.259	29.246	70	78	72	76	88	80	81.3	89	69	.652	.823	.677	.717
12	29.485	29.493	29.528	29.502	65	64	60	72	80	67	73.0	82	63.5	.524	.382	.425	.444
13	29.615	29.527	29.437	29.526	60	65	62	63	79	68	70.0	79	56	.478	.431	.476	.462
14	29.323	29.219	29.293	29.278	63	64	65	66	66	67	66.3	70	64	.536	.569	.591	.565
15	29.461	29.489	29.542	29.497	51	58	54	53	71	60	62.0	71.5	49	.321	.310	.338	.323
16	29.662	29.657	29.653	29.657	52	56	55	56	69	61	62.0	72	50	.335	.276	.354	.322
17	29.678	29.571	29.523	29.591	54	59	59	58	74	65	65.7	74	49	.365	.327	.420	.371
18	29.499	29.447	29.440	29.462	59	65	62	63	75	65	67.7	79	59	.447	.483	.516	.482
19	29.430	29.385	29.383	29.399	59	67	62	64	77	68	69.7	79.5	57.5	.433	.527	.476	.479
20	29.447	29.422	29.430	29.433	62	67	61	65	82	66	71.0	83.5	60	.516	.460	.470	.482
21	29.452	29.352	29.265	29.356	61	68	67	64	84	70	72.7	85	56	.497	.470	.622	.530
22	29.193	29.146	29.241	29.193	67	72	65	69	82	71	74.0	83	66	.635	.650	.537	.607
23	29.371	29.456	29.583	29.470	60	62	53	64	72	59	65.0	79.5	59	.465	.422	.323	.403
24	29.659	29.616	29.570	29.615	59	62	56	62	73	60	65.0	73.5	50.5	.460	.409	.396	.422
25	29.517	29.421	29.381	29.440	57	67	64	59	82	67	69.3	83	51.5	.439	.460	.556	.485
26	29.358	29.283	....	29.321	65	73	....	68	87	....	77.5	....	....	.577	.623	....	.600
27	29.254	29.155	29.182	29.197	71	72	62	75	80	65	73.0	85	64	.704	.677	.516	.632
28	29.254	29.259	29.256	29.256	62	67	64	63	78	71	70.7	84	58	.542	.514	.503	.520
29	29.369	29.423	29.515	29.436	60	64	58	63	76	63	67.3	78	60	.478	.436	.416	.443
30	29.626	29.578	29.534	29.579	52	60	57	54	72	63	63.0	74	51	.362	.358	.386	.369
31	29.426	29.217	29.082	29.242	57	68	66	59	78	69	68.7	80	52	.439	.550	.599	.529
Means....	29.421	29.377	29.389	29.396	64.7	67.3	63.7	66.6	79.4	68.9	71.6	....	....	.529	.520	.533	.527
Sept. 1	28.991	28.983	29.210	29.061	66.5	61	49	68	68	54	63.3	74	53	.630	.443	.282	.452
2	29.428	29.520	29.450	29.466	43.5	52	49	46	61	53	53.3	64	43	.250	.269	.295	.271
3	29.512	29.450	29.406	29.456	47	58.5	59	47	69	64	56.7	71	44	.323	.351	.433	.369
4	29.479	29.438	29.446	29.454	56	67	64	63	81	72	72.0	83	61	.356	.474	.489	.440
5	29.473	29.362	29.335	29.390	61	71	68	67	85	71	74.3	86	66	.457	.570	.644	.557
6	29.342	29.283	29.264	29.296	68	72	71	70	77	74	73.7	81	69	.658	.718	.718	.698
7	29.280	29.288	29.260	29.276	69	70	70	71	73	71	71.7	77	70	.682	.693	.720	.698
8	29.308	29.369	29.506	29.393	62	59	56	67	75	62	68.0	77	61	.489	.420	.369	.426
9	29.638	39.603	29.586	29.609	51	61	56	53	70	60	61.0	72	49	.321	.416	.396	.378
10	29.597	29.518	29.500	29.538	51	65	61	52	71	66	63.0	78	49	.361	.537	.470	.456
11	29.413	29.301	29.279	29.331	64	73	67	66	85	70	75.0	87	62	.569	.650	.622	.614
12	29.394	29.539	29.671	29.535	61	54	46	64	63	50	59.0	73	49	.497	.298	.258	.351
13	29.708	29.667	29.635	29.670	46	53	49	50	60	53	54.3	62	54	.258	.310	.295	.288
14	29.637	29.553	29.573	29.588	48	62	59	49	73	64	62.0	74	47	.322	.409	.433	.388
15	29.546	29.489	29.587	29.541	56	70	57	58	73	60	63.7	83	55	.422	.693	.426	.514
16	29.587	59.515	29.402	29.501	54	62	58	55	68	62	61.7	69	52	.404	.476	.429	.436
17	29.320	29.209	29.023	29.184	63	72	68	64	80	72	72.0	83	58	.562	.677	.631	.623
18	29.168	29.253	29.430	29.284	63	62	54	66	70	57	64.3	78	56	.536	.449	.378	.454
19	29.554	29.568	29.559	29.560	53	56	52	56	64	56	59.3	66	54	.363	.343	.335	.337
20	29.544	29.474	29.550	29.523	49	62	59	50	72	62	61.3	73	45	.335	.422	.460	.406
21	29.599	29.529	29.532	29.553	....	65	61	53	75	64	64.0	76	50	....	.483	.497	.490
22	29.543	29.462	29.457	29.487	53	64	61	54	81	66	67.0	82	51	.389	.369	.470	.409
23	29.447	29.314	29.182	29.314	57	65	64	58	78	68	68.0	81	54	.452	.443	.543	.479
24	29.447	29.487	29.519	29.484	49	53	46	51	64	49	54.7	71	49	.321	.257	.271	.283
25	29.528	29.446	29.436	29.470	44	55	50	45	66	54	55.0	67	41	.275	.287	.321	.294
26	29.471	29.420	29.426	29.439	47	57	50	49	70	54	57.7	72	43	.297	.293	.321	.304
27	29.431	29.353	29.358	29.381	47	61	58	48	76	63	62.3	72	43	.310	.336	.416	.354
28	29.338	29.278	29.303	29.306	59	65	59	61	70	62	64.3	72	58	.473	.550	.460	.494
29	29.350	29.372	29.389	29.370	60	61	55	61	67	57	61.7	72	55	.505	.457	.393	.452
30	29.442	29.415	29.417	29.425	54	59	58	56	61	59	58.7	64	53	.391	.473	.469	.444
Means....	29.451	29.410	29.423	29.429	55.2	61.6	57.8	57.2	71.5	61.6	63.4	....	....	.427	.452	.442	.439

of the north and northwestern lakes, at Detroit, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.704	.396	.634	.578	SW	SW	SW	1.8	3.6	1.2	2.2	S. 45 W	1	3	9	.395	....
.695	.512	.761	.656	N. NE	NE	E	2.4	3.0	0.6	1.9	N. 40 E	4	3	3	.205	....
.764	.3[illegible]	.613	.590	S	S	SW	6.0	6.6	0.6	4.3	S. 2 W	5	3	8	.400	....
.774	.609	.896	.760	SW	S	SW	4.2	9.0	1.2	4.3	S. 16 W	8	7	10	.226	....
.850	.618	.796	.755	SW	W.NW	Calm	5.4	2.4	0.0	2.2	S. 64 W	10	2	0	.214	1.04
.731	.392	.804	.642	NE	SE	W	4.2	3.6	0.6	1.6	N. 85 E	6	3	8	.150	....
.744	.565	.744	.684	S	SW	S	5.4	6.6	1.2	4.0	S. 22 W	5	4	0	.350	....
.822	.529	.744	.698	SW	SW	SW	7.2	6.6	3.0	5.6	S. 45 W	3	2	0	.300	....
.771	.574	.850	.732	W	W	N. NE	4.8	6.6	4.5	3.5	N. 67 W	10	8	1	.215	....
.668	.548	.761	.659	NE	E	E. SE	4.5	1.2	1.0	1.9	N. 62 E	5	5	1	.210	....
.727	.622	.661	.670	SW	SW	W	5.4	7.5	1.2	4.6	S. 48 W	9	5	1	.255	....
.668	.374	.642	.561	NW	NW	NE	3.6	6.5	1.8	3.4	N. 36 W	4	2	0	.228	....
.831	.434	.695	.633	NE	SW	NE	2.0	3.2	1.4	0.07	N. 45 E	1	2	2	.235	....
.838	.891	.893	.874	SW	N. NW	N	0.9	1.2	0.3	0.4	N. 51 W	10	10	3	.543	0.02
.743	.408	.653	.601	NW	NW	E. NE	4.2	5.2	0.2	3.0	N. 44 W	0	6	1	.190	0.96
.747	.391	.659	.599	N	N. NW	S	3.8	1.5	0.2	1.7	N. 6 W	1	5	0	.182	....
.756	.417	.680	.618	SW	S. SW	SE	0.2	4.0	0.6	1.4	S. 16 W	8	1	2	.210	....
.776	.558	.836	.720	SW	E. SE	E	0.2	3.8	2.5	2.0	S. 76 E	10	9	1	.155	....
.727	.569	.695	.664	NE	E. SE	S	1.2	1.9	0.5	0.8	S. 81 E	6	5	1	.184	....
.836	.422	.735	.664	S	SW	Calm	1.3	4.6	0.0	1.8	S. 35 W	2	4	1	.237	....
.833	.403	.848	.695	SW	E NE	SW	2.0	1.4	2.2	0.9	S. 35 W	2	9	10	.235	....
.896	.595	.708	.733	SW	SW	W	4.4	5.8	0.2	3.4	S. 46 W	10	5	1	.181	0.52
.780	.539	.647	.655	W. NW	NE	Calm	3.0	11.6	0.0	3.6	N. 30 E	0	9	0	.192	....
.828	.504	.765	.699	N. NE	NE	N	4.1	8.8	0.2	4.3	N. 37 E	2	1	0	.199	....
.880	.422	.841	.714	N	S	S	0.2	7.0	0.2	2.3	South	0	3	1	.273	....
.843	.486	......	.665	SW	S	....	1.4	6.7	....	2.5	S. 7 W	9	7	....	.271	....
.812	.661	.836	.770	SW	SW	Calm	0.2	0.2	0.0	0.1	S. 45 W	5	9	10	.081	0.10
.942	.537	.663	.714	NW	W.NW	W	0.2	3.6	1.2	1.6	N. 73 W	9	1	0	.210	0.78
.831	.486	.723	.680	NW	N. NW	N	1.2	1.8	2.4	1.7	N. 18 W	4	8	0	.295	....
.867	.437	.670	.665	Calm	E	S	0.0	0.7	0.3	0.2	S. 67 E	7	1	0	.035	....
.878	.574	.846	.766	East	S	Calm	0.2	0.6	0.0	0.2	S. 19 E	5	6	7	.170	....
.792	.519	.743	.685	....	....	....	....	....	....	0.7	S. 49 W.	5.4	4.9	2.4	7.226	3.42
.871	.647	.674	.731	SW	NW	NW	3.6	7.2	18.0	8.3	N. 53 W	10	8	9	.080	0.26
.805	.502	.733	.680	NW	N	Calm	3.6	0.7	0.0	1.3	N. 38 W	4	3	0	.115	0.02
1.000	.496	.727	.741	NW	SW	S	0.8	7.2	2.0	2.8	S. 40 W	0	0	0	.230	....
.619	.448	.624	.564	S	S	S	6.0	6.6	4.8	5.8	South	0	1	2	.255	....
.690	.474	.850	.671	SW	S	SW	3.0	8.4	3.0	4.4	S. 19 W	8	3	8	.245	....
.898	.774	.856	.843	SW	S	SE	2.4	7.2	0.6	3.1	S. 8 W	8	8	10	.100	0.06
.899	.854	.949	.901	S. SW	SW	S	5.0	1.8	5.0	3.7	S. 16 W	10	9	8	.106	0.16
.740	.680	.665	.695	NW	W	N	2.4	7.0	1.0	3.0	N. 73 W	8	5	0	.240	0.30
.743	.570	.765	.693	N	NE	Calm	1.0	2.4	0.0	1.0	N. 32 E	1	1	0	.132	....
.930	.708	.735	.791	E. NE	E	E	0.6	5.0	0.3	1.9	N. 88 E	10	0	0	.130	....
.891	.540	.848	.760	E	S	S	0.4	6.0	6.0	4.0	S. 2 E	8	4	6	.168	....
.833	.519	.716	.689	W	N	N	5.0	4.6	6.0	4.5	N. 22 W	9	9	0	.175	0.30
.716	.599	.733	.683	NE	NE	E	6.0	4.8	2.0	4.1	N. 52 E	8	8	0	.102	....
.926	.504	.727	.719	E	SW	E	0.2	3.5	1.5	0.8	S. 16 W	6	1	0	.111	....
.876	.854	.822	.851	Calm	N	NE	0.0	4.0	6.3	[illegible]	N. 28 E	1	4	10	.089	....
.934	.695	.772	.800	N	E	NE	4.0	5.0	1.8	2.7	N. 50 E	10	2	0	.083	0.18
.943	.661	.804	.803	E	SW	SE	2.0	4.0	3.2	1.7	S. 16 E	9	8	4	.130	....
.838	.613	.812	.754	SW	W	W	3.0	7.2	1.0	3.5	S. 78 W	5	8	1	.121	0.32
.809	.575	.747	.710	N	N	Calm	3.0	4.0	0.0	2.3	North	1	9	0	.079	....
.927	.539	.828	.765	Calm	SW	S	0.0	4.2	0.7	1.5	S. 39 W	1	2	0	.105	....
......	.558	.833	.695	S	SW	Calm	1.0	4.5	0.0	1.7	S. 37 W	0	0	0	.142	....
.933	.349	.735	.672	Calm	S	Calm	0.0	4.2	0.0	1.4	South	0	1	0	.157	....
.937	.463	.793	.731	S	S	S	1.2	7.1	4.8	4.4	South	1	8	9	.231	....
.859	.432	.781	.691	N	N	Calm	6.0	5.4	0.0	3.8	North	0	4	0	.147	0.88
.920	.450	.798	.723	Calm	SW	S	0.0	4.0	1.5	1.7	S. 33 W	0	1	0	.153	....
.853	.400	.798	.684	Calm	SW	E	0.0	3.7	0.2	1.2	S. 43 W	1	0	0	.125	....
.925	.375	.723	.674	Calm	S	Calm	0.0	5.4	0.0	1.8	South	1	5	0	.136	....
.882	.751	.828	.820	SE	SW	SW	1.5	3.7	0.1	1.4	S. 26 W	6	4	0	.053	....
.941	.600	.816	.816	NE	N	E	2.3	6.0	2.0	2.8	N. 26 E	10	8	0	.086	....
.872	.882	.939	.898	N	NE	E	0.3	6.0	2.7	2.8	N. 57 E	10	10	10	.006	....
.862	.587	.778	.742	....	....	....	....	....	....	0.5	S. 48 W.	4.9	4.5	2.9	4.032	2.48

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
October 1	29. 393	29. 393	29. 380	29. 389	59	62	64	61	69	65	65. 0	67	58	. 473	. 462	. 583	. 506
2	29. 344	29. 327	29. 412	29. 361	65	70	66	67	75	68	70. 0	78	64	. 591	. 666	. 612	. 640
3	29. 416	29. 362	29. 305	29. 361	66	70	66	67	74	68	70. 0	76	66	. 626	. 679	. 612	. 639
4	29. 413	29. 288	29. 579	29. 427	65	53	49	67	68	54	63. 0	71	53	. 591	. 204	. 282	. 359
5	29. 738	29. 717	29. 671	29. 715	43	52	47	46	60	51	52. 3	62	42	. 238	. 282	. 270	. 263
6	29. 457	29. 216	29. 152	29. 275	51	57	60	54	65	69	62. 6	70	47	. 335	. 359	. 398	. 364
7	29. 190	29. 140	29. 129	29. 153	65	71	68	68	81	73	74. 0	82	66	. 577	. 624	. 618	. 606
8	29. 155	29. 110	29. 170	29. 145	66	70	64	71	78	66	71. 6	82	62	. 586	. 625	. 569	. 593
9	29. 449	29. 392	29. 520	29. 454	54	52. 5	52	56	56. 5	55	55. 5	70	53	. 391	. 342	. 362	. 365
10	29. 492	29. 372	29. 419	29. 424	48	48	45	50	49	47	48. 6	58	46	. 309	. 322	. 273	. 301
11	29. 559	29. 550	29. 564	29. 558	43. 5	47	40	45	54	42. 5	47. 2	52	42	. 263	. 231	. 215	. 236
12	29. 510	29. 407	29. 361	29. 426	37	49	44	38	55. 5	46	46. 5	57	34	. 207	. 262	. 262	. 244
13	29. 337	29. 240	29. 317	29. 298	40	55. 5	46. 5	41	63	48. 5	50. 8	64	39	. 235	. 355	. 290	. 293
14	29. 406	29. 466	29. 565	29. 479	45	46	39	46	49. 5	42	45. 8	51	41	. 286	. 263	. 199	. 250
15	29. 619	29. 531	29. 431	29. 527	36	42	40. 5	37. 5	49	44	43. 5	51	34	. 192	. 175	. 207	. 191
16	29. 256	29. 150	29. 262	29. 223	43	46. 5	43	45	48	45	46. 0	50	42	. 251	. 297	. 251	. 267
17	29. 455	29. 530	29. 594	29. 526	37	44. 5	38	37. 5	51	40	46. 8	53	36	. 214	. 208	. 203	. 208
18	29. 632	29. 503	29. 355	29. 503	36. 5	51	50. 5	37. 5	59	56	50. 8	61	36	. 203	. 269	. 301	. 258
19	29. 345	29. 408	29. 559	29. 437	46	47	36	50	50	40. 5	46. 8	49	39	. 258	. 283	. 166	. 236
20	29. 578	29. 383	29. 149	29. 370	29. 5	41. 5	46	31	47	51	43. 0	51	30	. 146	. 190	. 245	. 194
21	28. 954	28. 881	28. 959	28. 932	46	52	43. 5	49	61	46. 5	52. 2	61	45	. 271	. 309	. 243	. 274
22	29. 175	29. 268	29. 463	29. 302	36	39	36	39	45	39	41. 0	50	37. 5	. 173	. 160	. 173	. 169
23	29. 661	29. 658	29. 548	29. 622	30	41	39	31. 5	48	42	40. 5	50	31	. 150	. 166	. 199	. 172
24	29. 376	29. 321	29. 581	29. 426	42	50	37	48	59	39	48. 6	61	38	. 189	. 242	. 194	. 208
25	29. 766	29. 782	29. 799	29. 782	30	32	29	34	34	31	33. 0	64	30	. 121	. 155	. 137	. 134
26	29. 654	29. 472	29. 412	29. 513	25	37	29	27	44	31	34. 0	44	26	. 112	. 129	. 137	. 126
27	29. 379	29. 384	29. 334	29. 366	24. 5	39	34	26	48. 5	37	37. 2	48	23	. 115	. 114	. 157	. 125
28	29. 344	29. 250	29. 297	29. 264	35	41	39	38	47. 5	44	43. 2	49	30	. 165	. 172	. 173	. 170
29	29. 352	29. 502	29. 557	29. 470	34. 5	44	39	36	54	42	44. 0	57	34	. 180	. 157	. 199	. 178
30	29. 441	29. 314	29. 449	29. 401	42	53	48. 5	48	67	56	57. 0	69	41	. 189	. 217	. 243	. 216
31	29. 366	29. 236	29. 311	29. 304	45	55	49	53	73	58. 5	61. 5	73	50	. 194	. 327	. 222	. 248
Means....	29. 427	29. 373	29. 407	29. 401	44. 0	50. 2	46. 3	47. 0	57. 5	49. 2	51. 3	....	....	. 286	. 298	. 290	. 291
Nov. 1	29. 348	29. 237	29. 209	29. 261	43	55	48	49	70	60	59. 7	70	47	. 199	. 234	. 177	. 203
2	29. 259	29. 100	29. 176	29. 178	46. 5	48	37	59	50	39	46. 3	62	37	. 271	. 177	. 194	. 214
3	29. 292	29. 424	29. 553	29. 423	36. 5	38. 5	32. 5	39	44. 5	35	39. 5	46	34	. 183	. 156	. 153	. 164
4	29. 552	29. 447	29. 394	29. 464	32	41	40	33. 5	47	43	41. 2	49	31	. 168	. 179	. 208	. 185
5	29. 271	29. 329	29. 494	29. 365	39	38	32	43	40	34	39. 0	49	34	. 186	. 203	. 155	. 181
6	29. 508	29. 332	29. 292	29. 377	26	32	32	27	37. 5	34	32. 8	49	29	. 129	. 110	. 155	. 131
7	29. 415	29. 479	29. 500	29. 465	29	32	28	31	36	29	32. 0	46	27	. 137	. 129	. 142	. 136
8	29. 446	29. 421	29. 510	29. 459	26. 5	35	32	27. 5	40	36	34. 5	42	25. 5	. 132	. 139	. 129	. 133
9	29. 590	29. 551	29. 600	29. 580	27	42	33. 5	28	50	37	38. 3	49	25	. 136	. 189	. 147	. 157
10	29. 614	29. 566	29. 466	29. 549	28	42	37	29	49. 5	40	40. 8	50	29	. 142	. 169	. 181	. 164
11	29. 325	29. 116	29. 130	29. 190	36. 5	45. 5	49	41	56. 5	54	50. 5	57	38	. 157	. 161	. 269	. 196
12	29. 488	29. 449	29. 474	29. 470	36	39	33	38	43	37	39. 3	54. 5	36	. 186	. 186	. 136	. 169
13	29. 589	29. 543	29. 535	29. 556	30. 5	38. 5	37	33	46	42	40. 3	43	32	. 142	. 136	. 155	. 144
14	29. 532	29. 666	29. 871	29. 690	36	36	30	41	40	33	38. 0	47	32	. 147	. 160	. 132	. 146
15	30. 029	30. 029	30. 004	30. 021	24	32	28. 5	26	34. 5	31	30. 5	36. 5	23. 5	. 106	. 149	. 128	. 128
16	29. 884	29. 728	29. 647	29. 753	32	45	44	34	51	47	44. 0	52. 5	28. 5	. 155	. 220	. 249	. 208
17	29. 659	29. 673	29. 746	29. 693	47	47. 5	43	48	49. 5	44. 5	47. 3	50. 5	43	. 310	. 303	. 245	. 286
18	29. 715	29. 576	29. 434	29. 575	39. 5	42	44. 5	40. 5	42. 5	45	42. 7	46. 5	39. 5	. 230	. 260	. 288	. 259
19	29. 223	29. 204	29. 125	29. 184	45	44	40	46	45	41	44. 0	48	40	. 286	. 275	. 235	. 265
20	29. 036	29. 136	29. 266	29. 146	31	36	31	35. 5	38	32	35. 2	44	31	. 176	. 186	. 162	. 175
21	29. 299	29. 246	29. 233	29. 259	24	32	32	24. 5	38	34	32. 2	39	23. 5	. 123	. 103	. 155	. 127
22	29. 237	29. 278	29. 450	29. 322	32	36	31. 5	32. 5	38	34	34. 8	41	30. 5	. 175	. 186	. 149	. 170
23	29. 599	29. 569	29. 510	29. 559	24. 5	31	28	26	34	31	30. 3	36	24	. 115	. 139	. 119	. 124
24	29. 396	29. 262	29. 219	29. 292	28	35. 5	34. 5	30	41	39	36. 7	42	27. 5	. 142	. 136	. 148	. 142
25	29. 196	29. 211	29. 259	29. 222	32	37	33. 5	32. 5	40	35	35. 8	41. 5	32	. 175	. 181	. 173	. 176
*26	29. 319	29. 311	29. 312	29. 314	30	30	29	31. 5	33	30	31. 5	38	29	. 150	. 132	. 149	. 144
27	29. 180	28. 980	28. 938	29. 033	27	29	31	29	30	32	30. 3	34	26	. 124	. 149	. 162	. 145
*28	28. 890	28. 879	28. 998	28. 922	29. 5	32	29	30	34. 5	31	31. 8	36. 5	29	. 158	. 149	. 137	. 148
29	29. 046	29. 083	29. 202	29. 110	28. 5	31	28	29. 5	33	30	30. 8	34	27	. 146	. 151	. 130	. 142
30	29. 247	29. 115	29. 219	29. 194	29. 5	34	33	31	36	34	33. 7	37	28	. 147	. 170	. 175	. 164
Means....	29. 406	29. 364	29. 389	29. 386	32. 6	37. 9	34. 8	34. 9	42. 3	37. 4	38. 2	....	....	. 168	. 174	. 171	. 171

* Snow.

of the north and northwestern lakes, at Detroit, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.882	.653	.944	.826	N. NE	NE	NE	2.0	2.0	0.4	1.4	N. 35 E	10	10	10	......	0.42
.893	.768	.895	.832	S. SW	SW	Calm	3.3	2.5	0.0	1.8	S. 32 W	10	9	9	......	0.10
.946	.810	.895	.881	NW	SW	S. SW	2.1	6.9	2.4	3.0	S. 52 W	10	8	1	......	0.03
.893	.299	.674	.622	SW	W	W. NW	6.5	10.5	1.3	5.6	S. 76 W	5	3	0	......	0.12
.767	.546	.722	.678	N	E	Calm	4.7	1.6	0.0	1.7	N. 19 E	0	1	2	......	....
.802	.582	.564	.649	S	S	SW	5.0	8.6	5.0	5.8	S. 12 W	8	9	8	......	....
.843	.590	.761	.731	S	SW	S	5.5	8.5	4.0	5.5	S. 21 W	7	5	1	......	....
.799	.653	.891	.781	S	SW	SW	10.0	6.0	4.7	6.3	S. 23 W	4	6	10	......	....
.872	.750	.867	.830	N	N. NE	E	1.7	2.4	2.7	1.8	N. 43 E	10	10	10	......	0.72
.856	.926	.847	.876	N	N	NW	5.7	6.0	4.0	4.9	N. 11 W	10	10	10	......	0.34
.880	.552	.789	.740	N	N	N. NE	3.0	7.1	0.3	3.5	North	8	7	1	......	0.38
.905	.594	.843	.781	N	E. NE	Calm	3.0	5.4	0.0	2.4	N. 45 E	0	3	0	......	....
.912	.638	.851	.800	N	E	Calm	1.5	1.3	0.0	0.6	N. 41 E	2	2	0	......	....
.921	.748	.744	.804	W	N	NE	1.5	6.0	6.5	3.7	N. 16 E	....	10	0	......	....
.856	.505	.717	.693	N	NE	E	2.0	2.2	0.1	1.3	N. 26 E	9	2	0	......	....
.840	.887	.840	.856	SW	S. SW	Calm	3.0	5.0	0.0	2.6	S. 31 W	9	10	1	......	....
.952	.558	.820	.777	NW	NW	Calm	1.5	3.5	0.0	1.7	N. 45 W	8	5	0	......	0.18
.904	.537	.684	.708	W	S	W	0.2	9.0	8.0	4.1	S. 42 W	1	4	0	......	....
.716	.786	.685	.729	N	W. NW	W	0.6	9.5	4.8	4.7	N. 73 W	6	9	1	......	....
.841	.590	.653	.695	NW	S	SW	0.2	6.0	13.0	6.0	S. 31 W	6	9	6	......	....
.781	.641	.769	.730	S	W	W	5.0	9.0	3.0	4.3	S. 67 W	10	6	10	......	0.02
.726	.533	.726	.662	W	W	NW	6.0	6.7	6.0	5.8	N. 76 W	0	9	0	......	0.24
.843	.494	.744	.691	W	SW	S	0.2	5.0	1.4	2.1	S. 37 W	1	4	6	......	....
.563	.484	.816	.621	S	SW	N	7.0	12.0	8.4	3.7	S. 50 W	9	10	10	......	0.07
.617	.792	.788	.732	NW	NW	E	5.4	4.2	7.8	2.3	N. 10 E	10	10	10	......	0.15
.761	.446	.788	.665	N	N	N	2.5	1.2	1.0	1.6	North	2	4	0	......	0.05
.815	.333	.712	.620	N	NW	S	1.2	5.5	2.4	1.5	N. 56 W	0	3	0	......	....
.719	.523	.597	.613	S	S	SW	2.0	6.7	2.0	3.4	S. 8 W	5	10	1	......	....
.851	.376	.744	.657	SW	W	Calm	3.6	7.2	0.0	3.3	S. 73 W	3	1	9	......	....
.563	.329	.540	.477	S	SW	SW	7.2	7.5	1.6	5.0	S. 25 W	8	2	0	......	....
.483	.568	.453	.501	SW	S. SW	SW	4.4	14.4	2.3	7.0	S. 29 W	0	5	0	......	....
.806	.596	.754	.719	....	....	....	....	....	....	1.7	S. 62 W	5.7	6.3	3.7	......	2.82
.572	.320	.342	.411	S	S	SW	4.0	8.0	4.0	5.0	S. 11 W	2	0	10	......	....
.750	.342	.816	.636	W	NE	NW	0.2	4.5	5.8	2.4	N. 10 W	10	10	10	......	....
.770	.528	.747	.682	W	NW	Calm	3.3	8.0	0.0	3.6	N. 58 W	9	7	0	......	0.46
.893	.554	.750	.732	E	S	S. SE	1.8	7.2	1.5	2.9	S. 15 E	1	9	10	......	....
.669	.820	.792	.760	SW	N	NW	4.0	7.5	2.4	2.6	N. 35 W	9	10	2	......	....
.880	.488	.792	.720	NW	S	E	0.2	2.4	0.2	0.7	S. 3 E	0	8	10	......	0.11
.788	.610	.887	.762	NE	N	N	7.8	10.8	5.4	7.5	N. 14 E	9	4	4	......	....
.882	.557	.610	.683	NW	NW	NW	4.5	5.0	0.6	3.4	N. 45 W	5	9	10	......	....
.883	.563	.665	.704	NW	W	Calm	0.3	4.2	0.0	1.4	N. 87 W	0	0	0	......	....
.887	.477	.732	.699	Calm	SW	SE	0.0	2.7	0.3	0.9	S. 39 W	3	0	3	......	....
.609	.352	.620	.527	S	S	SW	4.4	11.0	11.5	8.3	S. 19 W	10	10	10	......	....
.811	.669	.619	.700	NW	SW	W	0.2	3.2	4.5	2.4	S. 73 E	5	9	10	......	0.01
.752	.435	.577	.588	SW	SW	W. SW	3.5	9.0	1.0	4.4	S. 46 W	2	1	10	......	....
.567	.645	.703	.638	SW	W. NW	N	3.0	6.6	2.8	2.9	N. 69 W	9	10	6	......	....
.754	.744	.736	.745	N	NE	NE	2.5	4.2	7.0	4.3	N. 37 E	5	7	10	......	....
.792	.590	.772	.718	E	SE	E	3.0	1.4	1.8	1.9	S. 81 E	9	5	10	......	....
.925	.855	.803	.861	S	N	NE	1.8	3.0	7.0	2.6	N. 39 E	10	10	10	......	0.26
.911	.957	.959	.942	NE	E. NE	NE	3.5	4.0	2.0	3.1	N. 55 E	10	10	10	......	0.06
.921	.920	.912	.918	N	N. NE	NE	4.0	7.0	7.0	5.8	N. 26 E	10	10	11	......	0.44
.849	.811	.869	.843	NW	NW	N	8.5	5.0	2.4	5.2	N. 39 E	10	10	0	......	0.70
.936	.450	.792	.726	NW	W	S	2.0	4.0	4.0	2.0	S. 64 W	0	0	0	......	....
.945	.811	.764	.840	W	N	W	1.2	7.0	4.0	2.9	N. 37 W	9	9	0	......	....
.815	.712	.658	.728	NW	W	W	3.5	5.1	3.2	3.7	N. 77 W	8	9	0	......	....
.887	.529	.632	.683	SW	S	SW	6.5	9.0	4.7	6.2	S. 25 W	6	8	8	......	....
.945	.732	.847	.841	SW	W	W	1.8	4.0	2.0	2.4	S. 80 W	2	9	10	......	....
.843	.703	.890	.812	W	W	W	2.0	4.6	2.7	3.1	West	9	10	10	......	0.01
.775	.890	.896	.854	S	S	W	5.2	4.2	4.5	3.4	S. 26 W	10	10	10	......	....
.946	.744	.788	.826	SW	SW	W	3.5	4.6	3.0	3.3	S. 57 W	10	10	10	......	0.14
.889	.800	.782	.824	N	W	W	2.0	3.0	3.0	2.1	N. 71 W	10	10	10	......	0.01
.841	.802	.895	.846	SE	SE	NW	3.6	1.6	1.2	1.3	S. 45 E	10	10	10	......	....
.823	.647	.757	.742	....	....	....	....	....	....	1.0	N. 83 W	6.7	7.4	7.4	......	2.20

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29. 407	29. 514	29. 626	29. 516	30	33	31	31. 5	36	32	33. 2	37	30	. 150	. 149	. 162	. 154
2	29. 723	29. 647	29. 483	29. 618	22. 5	27. 5	27	23	30	29. 5	27. 5	35	21. 5	. 115	. 121	. 118	. 118
3	29. 336	29. 299	29. 379	29. 338	26. 5	27. 5	28. 5	28	29	30. 5	29. 2	32	26	. 126	. 133	. 133	. 131
4	29. 381	29. 276	29. 212	29. 289	25. 5	30	29	27	32	29. 5	29. 5	34	25. 5	. 120	. 144	. 154	. 139
5	29. 265	29. 108	29. 050	29. 141	25	28	26	25. 5	30. 5	27	27. 7	33	23	. 129	. 125	. 129	. 128
6	29. 274	29. 373	29. 483	29. 377	11	13	12	12	15	13	13. 3	29	11	. 061	. 056	. 063	. 060
7	29. 582	29. 568	29. 620	29. 590	9. 5	20	15	10	22	16. 5	16. 2	28	10	. 060	. 085	. 069	. 071
8	29. 500	29. 343	29. 451	29. 431	20	28	24	21	30	26	25. 7	30	13	. 096	. 130	. 106	. 111
9	29. 581	29. 609	29. 579	29. 589	25	27	29	27	29	30	28. 7	31	19	. 112	. 124	. 149	. 128
10	29. 513	29. 399	29. 389	29. 434	25	39. 5	35	26	47	40	37. 7	47	25	. 123	. 144	. 139	. 135
11	29. 373	29. 306	29. 329	29. 336	34	45	40	43	54	47	48. 0	54	35	. 079	. 181	. 156	. 139
12	29. 488	29. 412	29. 375	29. 425	41	43	39	43	48	44	45. 0	48	42	. 231	. 212	. 173	. 205
13	29. 309	29. 249	29. 321	29. 293	41	48. 5	48. 5	43	50	50	47. 7	52	42	. 231	. 321	. 321	. 291
14	29. 294	29. 219	29. 148	29. 220	46. 5	52	50. 5	47. 5	53	51. 5	50. 7	56	41	. 303	. 375	. 354	. 344
15	29. 062	29. 031	28. 977	29. 023	47	38. 5	33	48. 5	40. 5	34	41. 0	58	33	. 303	. 207	. 175	. 228
16	29. 036	29. 078	29. 343	29. 152	30	30. 5	27	30	33	29	30. 7	36	27	. 167	. 141	. 124	. 144
17	29. 613	29. 778	29. 943	29. 778	23	23	19	24	25. 5	20	23. 2	46	19	. 112	. 095	. 092	. 099
18	29. 877	29. 613	29. 449	29. 646	23	29. 5	31	25	31	32	29. 3	32	17	. 100	. 146	. 162	. 136
19	29. 579	29. 780	29. 965	29. 775	27	27	14	30	28	16	24. 7	33	15	. 113	. 136	. 059	. 103
20	30. 037	30. 039	29. 960	30. 012	15	18	16	16	21	18	18. 3	31	13	. 074	. 065	. 067	. 069
21	29. 749	29. 562	29. 535	29. 615	18. 5	24	31	20	25	32	25. 7	33. 5	17	. 083	. 117	. 162	. 121
22	29. 507	29. 356	29. 466	29. 443	35	41	37	38	43	39	39. 3	....	....	. 191	. 231	. 194	. 205
23	29. 535	29. 572	29. 621	29. 576	33	34	32	35	36	34	35. 0	42	31	. 162	. 170	. 155	. 162
24	29. 496	29. 355	29. 380	29. 410	36	50	46	37	53	49	46. 3	49	34	. 199	. 321	. 271	. 264
25	29. 396	29. 235	29. 218	29. 283	44	49	44	45	52	45	47. 3	53	44	. 275	. 308	. 275	. 286
26	29. 043	28. 852	28. 919	28. 938	39	43	44	40	44	46	43. 3	49	38	. 225	. 264	. 262	. 250
27	29. 247	29. 200	29. 203	29. 217	34	36	35	36	38	37	37. 0	59	34	. 170	. 186	. 178	. 178
28	29. 225	29. 167	29. 095	29. 162	31	38	42	32	42	43	39. 0	47	30	. 162	. 177	. 254	. 198
29	29. 244	29. 308	29. 376	29. 309	38	39. 5	35	40. 5	44	37	40. 5	45	36	. 196	. 184	. 178	. 186
30	29. 355	29. 257	29. 353	29. 322	32	29. 5	28	32	32	31	31. 7	40. 5	29	. 181	. 134	. 119	. 145
31	29. 567	29. 590	29. 709	29. 622	23	30	23	24	34	25	27. 7	34	23	. 112	. 121	. 100	. 111
Means....	29. 437	29. 390	29. 419	29. 415	29. 3	33. 6	31. 3	30. 9	36. 3	33. 3	33. 5	....	....	. 153	. 171	. 163	. 162
1863.																	
Jan. 1	29. 730	29. 578	29. 541	29. 616	22. 5	28. 5	27	23. 5	31	30	28. 2	33. 5	22	. 109	. 128	. 113	. 117
2	29. 410	29. 270	29. 258	29. 309	33. 5	35	36. 5	35	40	43. 5	39. 5	43	29	. 173	. 139	. 125	. 146
3	29. 193	29. 168	29. 076	29. 146	41. 5	45	46	45	46	47	46. 0	48	41	. 216	. 286	. 297	. 266
4	28. 656	28. 825	29. 102	28. 861	47	41	34	49. 5	43	37	43. 2	53	36	. 290	. 231	. 157	. 226
5	29. 083	29. 020	28. 947	29. 017	33	39	38	37	46	43	42. 0	51	35	. 136	. 147	. 164	. 149
6	29. 052	29. 054	29. 279	29. 128	31	26	20	34	29	22	28. 3	43	20	. 139	. 106	. 085	. 110
7	29. 502	29. 592	29. 641	29. 578	21	21	19	22	22	20	21. 3	34	19	. 101	. 101	. 092	. 098
8	29. 656	29. 585	29. 629	29. 623	19	26	26	21	29	28	26. 0	30	19	. 080	. 106	. 117	. 101
9	29. 662	29. 597	29. 474	29. 578	27	30	29	29	32	31	30. 7	32	26	. 124	. 144	. 137	. 135
10	28. 983	28. 925	29. 048	28. 985	37	34	32	39	37	33	36. 3	39	29	. 194	. 157	. 168	. 173
11	29. 052	29. 153	29. 393	29. 199	27	28	26	29	30	27	28. 7	32	27	. 124	. 130	. 129	. 128
12	29. 446	29. 370	29. 544	29. 453	25. 5	34	29	27	38	30. 5	31. 8	39	24	. 120	. 144	. 143	. 136
13	29. 605	29. 293	29. 170	29. 356	30	34	44	31	35	45	37. 0	46	28	. 155	. 183	. 275	. 204
14	29. 094	29. 009	29. 126	29. 076	41	34	28	43	35. 5	31	36. 5	50	30	. 231	. 176	. 119	. 175
15	29. 111	29. 017	28. 919	29. 016	25	24	24	26	25	25	25. 3	44	23	. 123	. 117	. 117	. 119
16	28. 890	29. 073	29. 342	29. 102	15	11	6. 5	16. 5	12	7	11. 8	27	7	. 069	. 061	. 052	. 061
17	29. 705	29. 791	29. 881	29. 792	-2. 5	17	14	-2. 5	19	15	10. 5	29	—3	. 039	. 071	. 071	. 060
18	29. 948	29. 881	29. 879	29. 903	12	24	20. 5	13	27	22. 5	20. 8	29	12	. 063	. 095	. 087	. 082
19	29. 858	29. 761	29. 723	29. 781	17	30	29	18	33	31	27. 3	34	15	. 083	. 132	. 137	. 117
20	29. 569	29. 409	29. 391	29. 456	31	32	32	32	32. 5	34	32. 8	35	30	. 162	. 175	. 155	. 164
21	29. 459	29. 503	29. 616	29. 526	32	33	33	33	34	34	33. 7	39	31	. 168	. 175	. 175	. 173
22	29. 585	29. 432	29. 475	29. 497	32	33	34	33	34	34	33. 7	37	31	. 168	. 175	. 196	. 179
23	29. 479	29. 475	29. 450	29. 468	33	34	34	34	35	35	34. 7	36	32	. 175	. 183	. 183	. 180
24	29. 380	29. 349	29. 488	29. 406	35	42	35	37	46	36	39. 7	47	35	. 178	. 215	. 191	. 195
25	29. 635	29. 609	29. 596	29. 613	30	39	33	31	43	35	36. 3	45	30	. 155	. 186	. 162	. 168
26	29. 451	29. 270	29. 266	29. 329	33	38	33	35	39	34	36. 0	39	33	. 162	. 216	. 175	. 184
27	29. 210	29. 239	29. 347	29. 265	28	31. 5	28	29	33	29	30. 3	36	28	. 142	. 160	. 142	. 148
28	29. 373	29. 328	29. 260	29. 320	26	28	22	27	30	23	26. 7	32	22	. 129	. 130	. 107	. 122
29	29. 111	28. 980	29. 008	29. 033	21	29	31	21. 5	31	33	28. 5	34	20	. 107	. 137	. 151	. 132
30	29. 077	29. 212	29. 396	29. 228	25	32	30	27	34	32	31. 0	35	26	. 112	. 155	. 144	. 137
31	29. 401	29. 284	29. 313	29. 333	26	32	30	27	36	31	31. 3	38	26	. 129	. 129	. 155	. 138
Means....	29. 366	29. 324	29. 373	29. 354	37. 5	31. 1	29. 1	29. 1	33. 4	30. 9	31. 1	....	....	. 140	. 151	. 145	. 145

of the north and northwestern lakes, at Detroit, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.843	.705	.896	.815	W	W	NW	1.5	5.0	5.7	3.8	N. 69 W	1	9	10	......	.01
.932	.729	.725	.795	NW	W	SE	3.0	3.5	2.5	1.3	N. 84 W	7	10	10	......	....
.826	.831	.785	.814	SW	W	W	3.5	4.2	3.7	3.5	S. 77 W	8	10	10	......	....
.821	.794	.945	.853	W	SW	W	2.4	5.0	3.5	3.3	S. 70 W	8	10	9	......	....
.938	.733	.880	.850	NW	W	W	4.5	6.5	8.5	6.1	N. 80 W	3	9	10	......	....
.804	.648	.810	.754	W	NW	NW	4.2	10.2	3.8	5.7	N. 55 W	1	8	0	......	....
.896	.721	.748	.788	W	W	SW	2.8	4.0	4.0	3.3	S. 74 W	1	10	0	......	....
.855	.782	.754	.797	S.	SW	Calm	3.0	3.2	0.0	1.9	S. 23 W	10	10	0	......	....
.761	.775	.890	.809	W	W	N	1.5	3.5	6.7	2.8	N. 37 W	10	10	10	......	....
.876	.446	.557	.626	SW	SW	S	4.0	2.7	2.8	2.9	S. 32 W	2	2	0	......	....
.283	.434	.483	.400	SW	SW	W	2.8	5.0	6.0	4.2	S. 64 W	0	0	10	......	....
.833	.631	.597	.687	W	S	S	0.1	3.0	2.6	1.9	S. 1 W	10	10	10	......	....
.833	.891	.891	.872	S.	S	W	4.0	6.0	5.5	3.8	S. 29 W	10	10	10	......	.01
.024	.932	.929	.928	W	S	S	2.6	8.4	2.4	3.7	S. 13 W	10	10	10	......	.55
.888	.822	.895	.865	W	W	NW	6.0	2.5	4.0	3.9	N. 76 W	10	10	10	......	.51
1.000	.752	.775	.842	W	W	W	3.5	8.0	12.0	7.8	West	10	9	3	......	.32
.868	.689	.850	.802	NW	NW	Calm	2.0	7.0	0.0	3.0	N. 45 W	10	3	0	......	.11
.746	.841	.896	.828	SW	SW	SW	14.0	8.0	8.0	10.0	S. 45 W	5	6	0	......	....
.675	.883	.659	.739	N	N	N	3.5	7.2	5.5	5.4	North	5	3	0	......	....
.829	.570	.682	.694	N	NE	E	6.0	3.5	4.7	3.7	N. 40 E	10	1	1	......	....
.776	.872	.896	.848	S	S	S	8.0	5.4	4.8	6.1	South	10	10	10	......	....
.900	.833	.816	.849	SW	SW	SW	6.0	3.5	2.0	3.8	S. 45 W	10	8	10	......	....
.797	.802	.792	.797	NE	NE	E	3.5	2.0	2.0	2.3	N. 57 E	10	10	4	......	....
.903	.798	.781	.827	E	S	W	3.0	3.6	6.0	1.5	S. 40 W	10	4	0	......	.11
.920	.794	.920	.878	S	SW	E	1.5	2.4	3.6	1.2	S. 31 E	10	10	10	......	....
.910	.918	.843	.890	NE.	E	SW	8.0	0.3	8.0	0.1	East	10	10	10	......	....
.802	.811	.807	.807	W	S	S	1.8	2.4	1.2	1.3	S. 27 W	10	10	7	......	.17
.896	.661	.916	.824	SW	S	S	6.0	7.2	6.0	5.9	S. 14 W	9	4	6	......	....
.779	.636	.807	.741	W	NW	NE	1.5	4.0	4.7	2.1	N. 10 W	9	8	10	......	....
.800	.744	.685	.743	E	NE	N	5.5	12.0	11.0	8.0	N. 36 E	10	10	10	......	.02
.868	.617	.746	.744	N	SW	S	1.8	2.6	3.2	1.2	S. 30 W	2	0	0	......	.04
.831	.745	.795	.790	....	....	....	....	....	....	1.8	S. 75 W	7.4	7.5	6.1	......	1.85
.866	.736	.675	.759	SW	S	S	8.6	5.0	4.5	5.5	S. 22 W	2	9	9	......	....
.847	.557	.439	.614	S.	S	S	5.0	6.3	6.5	5.9	South	10	10	10	......	....
.723	.921	.923	.856	S.	S	S	4.5	6.0	2.5	4.3	South	8	10	10	......	....
.819	.833	.712	.788	S.	SW	SW	11.5	10.2	4.0	8.0	S. 25 W	10	10	3	......	.36
.619	.471	.587	.559	SW	SW	SW	3.0	5.8	2.0	3.6	S. 45 W	2	6	10	......	.06
.712	.665	.721	.699	NW	W	NW	3.6	9.0	10.2	7.0	N. 63 W	10	10	10	......	.02
.860	.860	.850	.857	W	SW	SW	4.8	7.2	4.8	5.2	S. 57 W	9	10	9	......	....
.712	.665	.768	.715	SW	SW	Calm	2.2	9.2	0.0	3.8	S. 45 W	10	10	10	......	....
.775	.794	.788	.786	Calm	S	S	0.0	5.4	1.0	2.1	South	9	10	0	......	.01
.816	.712	.893	.807	S	SW	SW	5.7	11.0	7.5	7.7	S. 35 W	10	10	10	......	....
.775	.782	.880	.812	SW	NW	W	1.1	6.0	1.3	2.4	N. 61 W	4	10	10	......	.30
.821	.628	.839	.729	S	SW	Calm	4.0	3.5	0.0	2.3	S. 22 W	8	7	0	......	....
.893	.898	.920	.904	E	E	SW	2.5	3.5	4.2	1.4	S. 47 E	10	10	10	......	....
.8 3	.849	.685	.789	SW	W	NW	3.5	3.7	4.5	3.1	N. 85 W	10	10	10	......	.01
.876	.872	.872	.873	N	N	N	5.2	6.0	5.7	5.6	North	9	10	10	......	.01
.748	.804	.884	.812	N	NW	N	6.5	6.5	1.5	4.5	N. 20 W	10	10	0	......	....
1.000	.692	.823	.838	W	S	S	0.1	3.5	3.7	2.4	S. 1 W	9	1	0	......	.02
.810	.644	.725	.726	S	S	S	3.2	6.0	2.7	3.9	South	7	0	0	......	.26
.840	.703	.788	.777	SE	SE	E	0.2	1.8	3.6	1.7	S. 73 E	2	10	10	......	....
.896	.945	.792	.878	NE	NE.	N	6.1	8.4	8.0	7.0	N. 29 E	10	10	10	......	....
.898	.895	.895	.894	NE.	NE.	Calm	3.0	3.4	0.0	2.1	N. 45 E	10	10	10	......	.43
.893	.895	1.000	.929	SE.	S	SW	0.9	6.8	1.0	2.7	S. 1 W	10	10	10	......	....
.805	.898	.898	.897	S	NE.	SE.	0.5	1.8	2.3	1.0	S. 72 E	10	10	10	......	....
.807	.691	.900	.799	S	W	SW	0.7	3.6	4.6	2.6	S. 60 W	10	2	3	......	....
.893	.669	.797	.786	SW	SW	SW	1.5	4.8	1.5	2.6	S. 45 W	0	1	0	......	....
.797	.907	.805	.836	SE	SE	NE.	2.5	0.8	1.8	1.2	S. 73 E	10	10	10	......	....
.887	.850	.887	.875	N	N	N	5.0	5.0	7.4	5.8	North	10	10	10	......	.22
.880	.782	.864	.842	N	N	W	4.5	1.9	1.2	2.2	N. 11 W	10	6	0	......	.29
.920	.788	.800	.839	SW	S	SW	2.8	6.0	2.2	3.4	S. 20 W	3	8	3	......	....
.761	.792	.794	.782	W	W	W	3.2	5.0	7.5	5.2	West	9	2	2	......	.02
.880	.610	.893	.794	SW	S	S	7.0	9.0	3.0	5.9	S. 16 W	2	2	0	......	....
830	.768	.812	.803	....	....	....	....	....	....	1.6	S. 47 W	7.8	7.8	6.4	......	2.21

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°		°			
Feb'y 1	29.105	28.828	29.115	29.016	29	34	21	30	37	23	30.0	39	22	.149	.157	.090	.132
2	29.473	29.453	29.526	29.484	15	17	10	17	19	12	16.0	26	11	.063	.071	.046	.060
3	29.634	29.735	29.851	29.740	3	8	6	4	10	8	7.3	13	3	.038	.040	.034	.037
4	29.976	29.938	29.860	29.925	3	12	15	5	14	17	12.0	17	3	.027	.052	.063	.047
5	29.583	29.350	29.309	29.414	20	24	27	21	24	27	24.0	28	11	.096	.129	.147	.124
6	29.271	29.383	29.527	29.394	20	23	20	21	25	21	22.3	30	20	.096	.100	.096	.097
7	29.540	29.390	29.625	29.518	18	30	27	19	33	29	27.0	35	17	.087	.132	.124	.114
8	29.705	29.701	29.692	29.699	20	30	28	22	31	29	27.3	32	21	.085	.155	.142	.127
9	29.587	29.163	29.246	29.332	30	37	36	31	37.5	38	35.5	44	27	.155	.214	.186	.185
10	29.591	29.686	29.711	29.663	27	28	27	30	31	29	30.0	39	28	.113	.119	.124	.119
11	29.578	29.432	29.401	29.470	25	30	29	27	33	31	30.3	33	26	.112	.132	.137	.127
12	29.267	29.297	29.556	29.373	29	30	23	30	32	25	29.0	33	24	.149	.144	.100	.131
13	29.705	29.703	29.743	29.717	7	22	19	8	24	20	17.3	34	6	.048	.095	.092	.078
14	29.536	29.156	29.053	29.248	19	38	42	20	42	43	35.0	44	....	.092	.177	.254	.174
15	29.392	29.533	29.581	29.502	28	31	28	29	37	30	32.0	41	28	.142	.105	.130	.126
16	29.794	29.786	29.715	29.765	19	26	23	20	30	25	25.0	32	19	.092	.095	.100	.096
17	29.575	29.483	29.471	29.513	27	32	28	29	34	30	31.0	38	19	.124	.155	.130	.136
18	29.301	99.222	29.218	29.247	28	34	34	29	36	36	33.7	37	21	.142	.170	.170	.161
19	29.097	28.909	28.807	28.938	33	38	35	35	39	36	36.7	39	34	.162	.216	.191	.190
20	29.133	29.342	29.508	29.328	33	32	29	34	37	31	34.0	39	29	.175	.116	.137	.143
21	29.836	29.765	29.765	29.789	17	19	18	18	21	20	19.7	32	17	.083	.080	.076	.080
22	29.719	29.748	29.633	29.697	16	18	12	17	19	14	16.7	22	11	.078	.087	.052	.072
23	29.756	29.693	29.611	29.687	8	24	21	9	26	22	19.0	26	5	.051	.106	.101	.086
24	29.525	29.533	29.545	29.534	19	30	25	19.5	33	26	26.2	34	18	.097	.132	.123	.117
25	29.571	29.481	29.381	29.478	19	37	33	20	42	36	32.7	42	17	.092	.155	.149	.132
26	29.093	28.959	29.084	29.045	40	48	39	41	48.5	39	42.8	49	33	.235	.329	.238	.267
27	29.184	29.403	20.546	29.378	36	42	36	36	42.5	37	38.5	44	35	.212	.260	.199	.224
28	29.585	29.427	29.237	29.416	27	33	31	29	36	33	32.7	36	27	.124	.149	.151	.141
Means....	29.504	29.453	29.475	29.477	21.9	28.8	25.7	23.2	31.1	27.3	27.2	....	....	.111	.138	.127	.125
March 1	29.006	29.114	29.242	29.121	30	35	34	32	38	36	35.3	40	30	.144	.165	.170	.160
2	29.214	29.089	29.269	29.191	30	34	32	31	35	33	33.0	37	31	.155	.183	.168	.169
3	29.261	29.379	29.512	29.384	26	25	21	27	27	22	25.3	35	21	.129	.112	.101	.114
4	29.659	29.719	29.757	29.712	12	21	19	14	24	21	19.7	26	13	.052	.079	.080	.070
5	29.739	29.509	29.201	29.483	19	28	33	21	30	34	28.3	34	17	.080	.130	.175	.095
6	29.107	29.243	29.396	29.249	39.5	38	30	40	46	34	40.0	46	32	.236	.125	.121	.161
7	29.354	29.256	29.279	29.296	26	30	25	28	33	27	29.3	46	25	.117	.132	.112	.120
8	29.111	29.097	29.101	29.103	23	31	31	24	32	32	29.3	33	23	.112	.162	.162	.145
9	29.313	29.363	29.493	29.390	19	29	25	20	30	27	25.7	36	19	.092	.137	.112	.114
10	29.470	29.282	29.218	29.323	22	32	26	23	39	30	30.7	....	....	.107	.090	.095	.097
11	29.169	29.494	29.421	29.361	27	27	25	29	29	27	28.3	34	24	.124	.124	.112	.120
12	29.502	29.525	29.594	29.540	12	22	24	14	25	26	21.7	39	9	.052	.084	.106	.081
13	29.574	29.506	29.541	29.540	9	27	22	11	28	24	21.0	30	9	.043	.136	.095	.091
14	29.423	29.347	29.291	29.354	18	27	25	20	29	27	25.3	29	10	.076	.124	.112	.104
15	29.267	29.173	29.371	29.270	26	27	26	27	29	28	28.0	31	19	.129	.124	.117	.123
16	29.457	29.496	29.490	29.481	23	39	29	24	40	32	32.0	47	23	.112	.225	.126	.154
17	29.355	29.206	29.390	29.317	34	48	34	37	57	36	43.3	59	27	.157	.217	.170	.181
18	29.595	29.701	29.767	29.689	27	29	20	29	35	24	29.3	42	24	.124	.091	.062	.092
19	29.750	29.750	29.743	29.748	25	30	29	26	32	30	29.3	34	18	.123	.144	.149	.139
20	29.644	29.590	29.557	29.597	27	29	30	29	31	32	30.7	33	22	.124	.137	.144	.135
21	29.383	29.312	29.390	29.362	32	39	37	34	41	39	38.0	42	31	.155	.212	.194	.187
22	29.468	29.332	29.300	29.367	36	41	38	36	43	40	39.7	46	32	.212	.231	.203	.215
23	29.232	29.199	29.140	29.190	38	41	38	39	42	39	40.0	42	36	.216	.244	.216	.225
24	28.900	28.807	29.037	28.915	49	43	37	50	45	40	45.0	53	38	.335	.251	.181	.256
25	28.980	28.990	29.056	29.009	34	37	32	35	39	33	35.7	43	32	.183	.194	.168	.178
26	29.211	29.258	29.382	29.284	24	30	30	26	33	32	30.3	36	25	.106	.144	.132	.127
27	29.439	29.379	29.260	29.359	28	35	33	30	40	35	35.0	41	27	.130	.139	.162	.144
28	29.045	29.008	29.216	29.090	31	35	25	33	39	26	32.7	47	25	.151	.152	.123	.142
29	29.349	29.464	29.581	29.465	18	31	28	19	33	31	27.7	36	17	.087	.151	.119	.119
30	29.635	29.520	29.350	29.502	26	36	31	27	42	35	34.7	47	24	.129	.134	.128	.130
31	29.064	29.000	29.259	29.108	31	34	20	33	35	23	30.3	38	22	.151	.183	.074	.136
Means....	29.344	29.326	29.374	29.348	26.1	32.5	28.6	28.0	35.5	30.8	31.4	....	....	.133	.153	.136	.140

of the north and northwestern lakes, at Detroit, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.890	.712	.730	.777	S	S	W	4.0	7.5	14.2	6.2	S. 52 W.	9	10	7	......	....
.671	.692	.610	.658	W	W	W	8.4	7.5	4.5	6.8	West.	9	8	10	......	....
.740	.582	.553	.625	W	NW	N	2.0	7.2	1.2	3.1	N. 49 W.	10	4	0	......	....
.500	.635	.671	.602	NE	SE	SE	2.0	7.2	4.0	3.7	S. 55 E.	4	10	4	......	....
.855	1.000	1.000	.952	SE	E	Calm	5.4	3.5	0.0	2.7	S. 62 E.	10	10	10	......	....
.855	.746	.855	.819	W	W	SE	1.3	5.4	2.3	1.8	S. 72 W.	10	10	4	......	.26
.845	.703	.775	.774	S	S	Calm	6.0	4.2	0.0	3.4	South	4	5	0	......	....
.721	.893	.887	.834	SW	E.NE	E	0.3	4.0	6.4	3.3	N. 82 E.	9	10	10	......	....
.893	.952	.811	.885	NE	S	SW	6.0	5.5	18.0	5.5	S. 31 W.	10	10	10	......	.18
.675	.685	.775	.712	NW	W	W	7.0	5.0	1.5	4.1	N. 67 W.	10	10	10	......	.54
.761	.703	.788	.751	SE	SE	S	2.3	2.0	0.5	1.5	S. 41 E.	8	10	0	......	....
.800	.794	.746	.810	NE	N	N	7.8	6.0	3.5	5.3	N. 20 E.	10	10	10	......	.54
.777	.738	.850	.788	N	N	E	1.1	2.0	2.5	1.3	N. 39 E.	3	9	0	......	.06
.850	.661	.916	.809	E	S	W	4.0	7.5	8.0	2.8	S. 28 W.	0	8	0	......	....
.887	.476	.782	.715	W	W	W	6.2	7.5	1.8	5.2	West.	3	0	0	......	....
.850	.596	.746	.731	NW	W	E	0.7	1.6	0.5	0.5	N. 73 W.	1	7	9	......	.19
.775	.792	.782	.783	E	NE	NE	4.7	4.0	2.4	3.4	N. 64 E.	0	0	0	......	....
.887	.802	.802	.830	E	E	NE	1.6	4.8	2.0	2.7	N. 80 E.	10	10	10	......	....
.797	.907	.900	.868	Calm	E	E	0.0	2.4	2.5	1.6	East	10	10	10	......	.04
.897	.527	.788	.737	NW	NW	N	5.0	6.0	5.7	5.2	N. 30 W.	10	2	7	......	....
.840	.712	.702	.751	N	E.NE	NE	6.0	9.0	8.3	7.0	N. 43 E.	10	10	10	......	....
.834	.845	.635	.771	NE	N.NE	NE	10.6	9.0	2.1	7.0	N. 36 E.	10	10	0	......	.01
.784	.754	.860	.799	N	N	SE	3.0	4.0	4.0	1.7	N. 34 E.	9	8	7	......	....
.924	.703	.876	.834	E	SW	SW	1.8	4.5	1.4	1.6	S. 29 W.	7	0	1	......	....
.850	.577	.705	.711	S	S	SE	0.1	4.0	2.5	2.0	S. 17 E.	1	7	9	......	....
.912	.962	1.000	.958	S	S	W	5.3	7.0	9.0	5.0	S. 36 W.	10	8	10	......	.26
1.000	.957	.903	.953	W	W	W	5.5	7.0	0.2	4.2	West.	10	3	3	......	....
.775	.705	.800	.760	NE	NE	NE	1.5	4.5	5.0	3.7	N. 45 E.	8	10	8	......	....
.819	.742	.794	.785	....	....	....	....	....	....	0.3	N. 33 W.	7.3	7.4	5.6	......	2.08
.794	.719	.802	.772	N	W.NW	SW	5.5	6.0	3.0	4.8	N. 54 W.	10	8	9	......	.01
.893	.898	.893	.895	SW	SE	S	1.2	1.4	3.3	1.9	S. 1 E.	4	10	10	......	....
.880	.761	.860	.834	NE	NW	N	9.0	4.8	3.8	5.9	N. 13 E.	10	10	9	......	....
.635	.610	.712	.652	NW	N	Calm	8.5	6.5	0.0	5.0	N. 26 W.	0	5	3	......	....
.712	.782	.895	.796	S	S	SW	3.0	8.0	8.5	6.5	S. 19 W.	8	10	10	......	....
.954	.400	.617	.657	W	W	NE	8.5	7.0	4.8	6.7	N. 75 W.	10	6	10	......	.01
.768	.703	.761	.744	NE	NE	NE	7.7	8.3	4.8	6.9	N. 45 E.	10	3	10	......	....
.868	.896	.896	.887	Calm	S	SW	0.0	1.7	3.5	1.7	S. 31 W.	8	10	10	......	.02
.830	.788	.761	.800	W	W	W	6.0	7.6	6.3	6.6	West.	0	3	0	......	....
.864	.379	.569	.604	SW	SW	S	3.0	5.4	2.0	3.5	S. 36 W.	0	3	0	......	....
.775	.775	.761	.770	S	NW	N	1.0	7.2	1.3	3.2	N. 43 W.	9	10	2	......	....
.635	.622	.754	.670	N	NW	W	2.0	3.0	4.0	3.0	N. 56 W.	7	9	0	......	.12
.596	.883	.738	.739	NW	NW	W	2.3	8.0	1.5	3.9	N. 50 W.	9	9	0	......	....
.702	.775	.761	.746	N	SW	S	2.0	1.8	4.0	2.6	S. 21 W.	10	10	0	......	....
.880	.775	.768	.808	E	E.NE	SE	6.0	9.0	3.0	6.0	N. 85 E.	8	10	0	......	....
.868	.910	.694	.824	N	W.NW	SW	1.6	2.7	4.0	2.8	S. 88 W.	0	0	3	......	....
.712	.465	.802	.660	SW	SW	SW	2.4	1.8	5.0	3.1	S. 45 W.	7	9	10	......	....
.775	.448	.483	.569	E.NE	NE	NE	6.0	8.4	7.0	7.1	N. 51 E.	0	0	0	......	.14
.876	.794	.890	.853	E	NE	E	6.0	4.0	6.0	5.3	N. 80 E.	9	10	10	......	....
.775	.778	.794	.782	E.NE	E.NE	E	6.6	7.2	8.0	7.3	N. 76 E.	10	10	10	......	....
.792	.824	.816	.811	SE	SW	SW	2.4	3.0	17.0	7.5	S. 38 W.	10	10	0	......	....
1.000	.833	.820	.884	E.NE	E.NE	E	0.3	1.6	5.0	2.3	N. 84 E.	10	10	10	......	....
.907	.914	.907	.909	NE	NE	NE	4.5	3.5	4.0	4.0	N. 45 E.	10	10	10	......	.45
.927	.840	.732	.833	SE	W	NW	5.5	8.5	2.0	5.3	S. 68 W.	10	10	10	......	.35
.898	.916	.893	.902	NW	W	W	1.2	6.0	3.2	3.5	N. 85 W.	10	10	10	......	.38
.754	.794	.703	.750	NW	W	W	2.3	5.5	1.5	3.1	N. 79 W.	3	10	10	......	.18
.782	.557	.797	.712	W	E	E	0.3	3.0	2.2	1.8	East	1	6	0	......	....
.800	.636	.867	.771	E	NW	NW	1.8	10.0	12.5	8.1	N. 42 W.	4	9	9	......	....
.845	.800	.685	.777	NW	W.NW	W	4.3	4.8	2.0	3.7	N. 63 W.	10	9	1	......	....
.880	.500	.628	.669	W.NW	SW	S	2.5	3.0	1.2	2.2	S. 29 W.	1	2	5	......	....
.800	.898	.598	.765	S	W	NW	2.2	2.3	4.5	3.1	N. 78 W.	9	10	1	......	.16
.812	.729	.731	.757	....	....	....	....	....	....	4.4	N. 45 W.	6.6	7.7	5.5	......	1.82

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	29.376	29.114	28.828	29.106	14	30	33	15	32	39	28.7	40	12	.071	.144	.110	.108
2	28.581	28.771	29.013	28.788	44	39	32	49	48	38	45.0	50	37	.223	.121	.103	.149
3	29.241	29.495	29.631	29.456	32	32	27	34	37	29	33.3	39	27	.155	.116	.124	.132
4	29.701	29.628	29. 35	29.521	24	33	28	26	40	31	32.3	42	22	.106	.097	.119	.107
5	29.419	29.212	29.180	29.270	27	42	41	29	55	48	44.0	56	24	.124	.228	.166	.173
6	29.117	29.214	29.372	29.234	34	35	30	36	36	31	34.3	48	31	.170	.191	.155	.172
7	29.443	29.522	29.588	29.518	29	30	27	30	33	30	31.0	33	27	.149	.132	.113	.131
8	29.636	29.572	29.624	29.611	27	32	31	28	36	33	32.3	36	26	.136	.129	.151	.139
9	29.674	29.557	29.473	29.568	29	37	36	31	44	38	37.7	47	26	.149	.129	.186	.155
10	29.267	29.129	29.134	29.177	39	51	52	46	61	57	54.7	64	31	.147	.242	.322	.237
11	29.072	29.011	29.090	29.058	50	59	53	59	71	54	61.3	74	53	.242	.340	.389	.324
12	29.328	29.411	29.459	29.399	36	38	30	39	42	32	37.7	56	31	.173	.177	.144	.165
13	29.520	29.502	29.508	29.510	29	39	35	31	46	38	38.3	49	26	.137	.147	.165	.150
14	29.457	29.374	29.301	29.377	36	41	38	38	53	43	44.7	53	31	.186	.100	.164	.150
15	29.267	29.212	29.278	29.252	41	48	43	46	56	45	49.0	57	42	.192	.230	.251	.224
16	29.308	29.219	29.332	29.286	43	46	43	44	51	46	47.0	52	42	.254	.245	.238	.249
17	29.335	29.293	29.314	29.314	43	47	43	45	52	46	47.7	53	39	.251	.257	.238	.249
18	29.322	29.367	29.265	29.318	43	50	44	45	58	47	50.0	69	35	.251	.255	.249	.252
19	29.200	29.214	29.304	29.239	46	53	50	49	61	52	54.0	61	42	.271	.297	.334	.301
20	29.371	29.403	29.466	29.413	41	54	51	54	62	56	57.3	64	47	.087	.312	.308	.236
21	29.540	29.432	29.435	29.469	46	52	49	46	56	51	51.0	57	44	.311	.335	.321	.322
22	29.342	29.324	29.296	29.321	46	46	47	48	47	48	47.7	54	45	.284	.297	.310	.297
23	29.171	29.183	29.184	29.179	45	49	48	48	51	50	49.7	54	45	.260	.321	.309	.297
24	29.160	29.139	29.295	29.198	43	55	44	47	71	48	55.3	72	40	.225	.221	.236	.261
25	29.396	29.414	29.468	29.426	34	42	38	38	50	41	43.0	52	34	.144	.162	.190	.165
26	29.540	29.503	29.433	29.492	35	42	44	40	56	48	48.0	64	31	.139	.084	.236	.153
27	29.432	29.367	29.273	29.357	42	48	47	47	65	52	54.7	66	35	.202	.111	.257	.190
28	29.151	29.071	29.128	29.117	45	50	43	59	62	48	43.3	64	43	.234	.202	.212	.216
29	29.099	29.107	29.221	29.142	44	54	44	48	61	48	52.3	61	41	.236	.325	.236	.266
30	29.259	29.283	29.256	29.266	41	51	47	48	64	52	54.7	65	38	.166	.202	.257	.208
Means . . .	29.324	29.301	29.313	29.313	34.3	44.1	40.6	41.1	51.9	44.3	45.8	. . . .	. . . .	.189	.205	.220	.205
May 1	29.324	29.228	29.206	29.253	47	52	46	52	71	78	60.3	71	38	.250	.137	.153	.180
2	29.208	29.275	29.307	29.263	46	53	38	52	62	44	52.7	62	42	.232	.284	.151	.222
3	29.220	29.231	29.191	29.214	43	48	47	45	56	52	51.0	57	40	.251	.230	.257	.246
4	29.105	29.162	29.151	29.139	45	52	45	49	59	47	51.7	60	46	.247	.296	.273	.272
5	29.092	29.100	29.177	29.123	40	39	38	42	41	39	40.7	48	37	.221	.212	.216	.216
6	29.205	29.277	29.319	29.267	39	43	40	40	44	43	42.3	45	37	.235	.264	.208	.232
7	29.288	29.247	29.270	29.268	40	48	42	43	58	46	49.0	58	39	.208	.203	.215	.209
8	29.348	29.367	29.276	29.330	43	55	48	47	70	53	57.3	70	36	.225	.214	.243	.234
9	29.305	29.267	29.283	29.285	48	58	51	54	71	63	62.7	74	45	.256	.270	.238	.288
10	29.304	29.170	29.229	29.234	54	62	57	61	75	63	66.3	75	56	.325	.382	.386	.361
11	29.290	29.283	29.310	29.294	58	65	58	62	80	62	68.0	83	58	.429	.417	.429	.425
12	29.358	29.414	29.384	29.385	60	56	54	62	59	56	59.0	65	55	.491	.409	.363	.421
13	29.382	29.264	29.245	29.297	49	56	53	50	69	58	59.0	71	45	.335	.276	.336	.316
14	29.263	29.335	29.413	29.337	45	50	45	47	60	51	52.7	62	45	.273	.229	.220	.241
15	29.435	29.330	29.159	29.308	44	51	49	47	63	56	55.3	65	39	.249	.216	.255	.240
16	28.998	29.046	29.171	29.072	51	52	45	59	69	53	60.3	69	52	.269	.163	.149	.209
17	29.216	29.237	29.305	29.253	43	48	47	48	58	51	52.3	69	40	.212	.203	.270	.228
18	29.393	29.426	29.416	29.412	44	50	47	48	61	54	54.3	65	40	.236	.216	.231	.228
19	29.493	29.380	29.374	29.416	43	53	55	51	74	62	62.3	73	41	.173	.125	.340	.213
20	29.467	29.416	29.469	29.451	51	62	58	58	80	69	69.0	85	54	.282	.396	.336	.338
21	29.554	29.514	29.552	29.540	55	65	60	59	82	70	70.3	85	54	.380	.390	.385	.385
22	29.599	29.475	29.460	29.511	60	65	62	65	85	69	73.0	86	53	.451	.350	.462	.421
23	29.386	29.243	29.299	29.309	58	67	62	62	85	69	72.0	86	56	.429	.420	.462	.470
24	29.267	29.203	29.197	29.222	54	60	60	59	76	68	67.7	78	54	.351	.305	.411	.356
25	29.164	29.142	29.209	29.172	57	64	62	61	77	65	67.7	79	54	.412	.422	.516	.450
26	29.302	29.256	29.358	29.305	57	64	59.5	60	73	65.5	62.8	82	58	.426	.476	.429	.444
27	29.408	29.364	29.409	29.394	59	62	59	63	74	66	67.7	75	52	.447	.396	.407	.417
28	29.436	29.325	29.319	29.360	56	59	62	62	72	67	67.0	79	55	.396	.327	.489	.395
29	29.234	29.060	29.053	29.116	57	65	65	62	78	70	70.0	78	55	.399	.443	.550	.464
30	28.849	28.730	28.780	28.793	63	66	63	64.5	67	64	65.2	72	64	.556	.626	.562	.581
31	28.787	28.773	28.784	28.781	59	70	59	62	72	60	63.0	72	60	.460	.706	.487	.381
Means . . .	29.283	29.244	29.260	29.262	50.6	56.8	52.8	54.7	68.5	58.5	60.6	. . . .	. . . .	.325	.323	.341	.330

of the north and northwestern lakes, at Detroit, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.			
											°						
.823	.794	.463	.693	NW	S	S	3.3	7.5	6.2	3.8	S. 12 W	3	8	0	......	.16
.638	.359	.450	.482	W	NW	Calm	7.5	6.3	0.0	4.2	N. 70 W	9	7	5	......	....
.792	.527	.775	.698	NE	N	E	5.3	7.3	3.0	4.3	N. 31 E	9	8	0	......	.01
.754	.393	.685	.577	N	E	SW	2.5	4.6	0.8	1.5	N. 64 E	0	0	0	......	....
.775	.762	.494	.677	SW	NW	W	0.3	2.4	2.0	1.4	N. 69 W	1	0	10	......	....
.802	.900	.893	.865	NW	N	NW	4.3	7.2	8.3	6.0	N. 28 W	10	10	8	......	....
.890	.703	.675	.739	N	N	NE	2.0	0.7	3.8	1.9	N. 26 E	3	10	0	......	.01
.883	.610	.800	.764	N	NE	SE	0.3	0.3	1.3	0.4	S. 70 E	10	10	0	......	....
.890	.446	.811	.716	S	SW	S	1.0	7.8	0.4	2.9	S. 38 W	0	1	0	......	....
.471	.452	.692	.538	S	S	S	5.0	4.2	4.0	4.4	South	9	10	10	......	....
.481	.449	.933	.622	S. SW.	S	S	2.3	6.0	2.0	3.3	S. 5 W	8	9	8	......	....
.726	.661	.794	.727	N	N	N	8.3	4.8	1.5	4.9	North	5	9	0	......	.42
.788	.471	.719	.659	N	E	Calm	2.5	4.3	0.0	1.7	N. 60 E	0	1	0	......	....
.811	.249	.587	.549	NE	NE	NE	3.5	10.3	3.5	5.8	N. 45 E	5	8	0	......	....
.617	.512	.840	.656	NE	NE	NE	6.7	6.0	5.8	5.8	N. 45 E	9	9	2	.011	....
.918	.653	.767	.779	NE	N	N	5.6	8.8	5.0	6.0	N. 12 E	10	10	10	.071	.12
.840	.660	.767	.756	N	N	S	2.5	4.5	1.8	1.7	North	9	1	2	.059	....
.840	.529	.772	.714	E	E	E	2.7	8.0	4.8	5.2	East	0	8	10	.184	....
.781	.553	.861	.732	NE	NE	N	4.5	1.2	2.3	2.4	N. 32 E	1	5	10	.083	.20
.208	.551	.687	.485	W. NW.	N	S	1.6	2.7	0.1	1.2	N. 24 W	10	9	1	.098	....
1.000	.717	.859	.869	E	NE	E	9.0	8.0	6.3	7.3	N. 75 E	10	10	0	......	....
.850	.923	.925	.809	NE	E	NE	7.0	6.0	3.3	5.0	N. 61 E	10	10	0	.162	.47
.777	.853	.856	.831	NE	E. NE.	Calm	5.4	3.6	0.0	2.9	N. 54 E	10	10	1	.046	....
.698	.292	.704	.565	N	N	N. NE.	3.0	7.2	7.5	5.7	N. 10 E	0	2	0	.268	....
.628	.450	.738	.695	N	E	NE	6.0	7.0	4.0	4.3	N. 48 E	0	0	0	......	....
.557	.186	.704	.482	NE	E	SE	0.3	4.8	3.6	2.6	S. 73 E	0	4	5	.296	....
.624	.179	.660	.488	S. by W	SW	N	0.3	8.5	0.6	2.7	S. 47 W	6	5	7	.285	....
.646	.364	.631	.517	SE	NE	E	3.6	7.2	4.7	4.2	N. 78 E	10	10	9	.105	....
.704	.606	.704	.671	NE	N	NE	0.2	1.2	1.8	0.9	N. 27 E	10	9	1	.120	....
.494	.310	.669	.498	N	E. SE.	SW	4.2	3.0	4.7	0.2	S. 63 W	0	0	0	......	....
.723	.540	.730	.664	....	....	....	....	....	....	1.7	N. 42 E	5.6	6.4	3.3	1.788	1.40
.633	.181	.318	.377	Calm	S	S	0.0	7.2	0.3	2.5	South	0	0	0	.225	....
.598	.511	.522	.544	S	E	NE	0.5	6.9	6.6	4.1	N. 70 E	6	1	0	.192	....
.840	.512	.660	.671	E. NE.	E	E	1.0	6.6	4.7	4.1	N. 88 E	10	8	10	.180	....
.710	.592	.847	.716	NE	NE	NE	6.0	7.0	5.6	6.2	N. 45 E	10	7	10	.030	.01
.829	.824	.907	.853	NE	NE	NE	12.0	12.0	7.2	10.4	N. 45 E	10	10	10	.020	.52
.910	.918	.750	.859	N	NE	NE	10.0	9.0	4.0	7.1	N. 26 E	10	10	10	.050	.58
.759	.421	.691	.621	N	N	Calm	3.5	6.0	0.0	3.2	North	7	7	0	.152	.01
.698	.320	.561	.526	E	E	S	0.5	1.5	1.0	0.7	S. 63 E	0	1	0	.145	....
.613	.322	.653	.529	SW	W	Calm	1.5	3.0	0.0	1.3	S. 75 W	9	5	3	.176	....
.696	.441	.670	.572	S	SW	SW	2.5	1.2	0.2	1.2	S. 15 W	10	9	0	.184	....
.772	.407	.772	.650	NW	SW	NE	2.5	4.7	2.5	1.1	N. 88 W	7	7	3	.270	....
.884	.819	.809	.837	NW	W	W	1.8	4.5	1.0	2.3	N. 80 W	10	10	7	.054	.01
.927	.391	.698	.672	W	SW	SW	1.8	4.5	1.5	2.4	S. 45 W	7	3	10	.183	.06
.847	.442	.590	.626	N	N	NE	6.5	8.5	4.0	6.0	N. 9 E	8	7	8	.120	.10
.772	.375	.569	.572	N	W	SE	1.2	5.0	2.6	1.1	S. 79 W	0	5	9	.191	....
.537	.231	.483	.417	W	W	W	5.7	11.5	2.7	6.6	West	1	5	0	.304	....
.631	.421	.722	.591	W	W	W	3.8	9.5	3.7	5.7	West	2	8	9	.160	....
.704	.402	.552	.553	N	W	W	3.6	6.0	0.5	2.5	N. 61 W	1	6	0	.295	....
.461	.148	.612	.407	W. SW.	W	Calm	1.0	7.8	0.0	2.9	S. 87 W	0	4	0	.350	....
.584	.472	.475	.510	SW	SW	Calm	6.0	5.3	0.0	3.8	S. 45 W	0	4	0	.305	....
.761	.357	.525	.548	SW	SW	S	0.3	3.6	1.2	1.6	S. 35 W	0	0	0	.271	....
.731	.291	.653	.558	S	SW	Calm	0.1	3.3	0.0	1.1	S. 44 W	0	0	0	.266	....
.772	.349	.653	.591	Calm	S. SE.	SW	0.0	3.6	6.4	2.8	S. 23 W	0	0	2	.338	....
.703	.340	.601	.548	W	SW	S	1.2	7.6	1.2	3.0	S. 45 W	0	3	9	.309	....
.769	.456	.836	.687	S	E	E	1.0	4.6	1.3	2.0	S. 80 E	0	6	4	.194	....
.822	.588	.683	.698	E	E	E	2.0	7.7	4.8	4.8	East	8	1	2	.189	.20
.776	.472	.636	.628	E	E. NE.	E	3.6	7.2	2.0	4.1	N. 77 E	3	2	10	.392	....
.665	.417	.740	.607	E	E	Calm	1.0	8.4	0.0	3.1	East	8	0	3	.270	....
.718	.463	.751	.644	E	E	NE	1.3	5.2	2.0	2.7	N. 80 E	10	9	8	......	....
.916	.916	.943	.935	NE	S. SW.	W	3.6	8.0	2.3	1.9	S. 31 W	10	10	10	......	....
.828	.900	.940	.889	NW	W	SW	4.0	1.3	5.0	2.6	S. 85 W	10	9	2	......	1.18
.670	.475	.672	.606	....	....	....	....	....	....	0.5	N. 18 E	5.1	5.1	4.5	5.815	2.67

M.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	28.844	28.896	28.795	28.845	53	49	48	57	60	54	57.0	68	52	.350	.203	.256	.270
2	28.959	29.112	29.197	29.089	49	59	50	52	72	54	59.3	67	46	.308	.327	.308	.314
3	29.286	29.289	29.299	29.291	46	52	49	49	62	53	54.7	65	43	.271	.236	.282	.270
4	29.293	29.192	29.225	29.237	46	54	54	48	66	60	58.0	67	44	.284	.239	.338	.294
5	29.263	29.143	29.391	29.232	56	60	48	60	65	50	58.3	64	49	.396	.451	.309	.385
6	29.509	29.548	29.578	29.545	47	50	44	49	53	48	50.0	60	41	.297	.321	.236	.285
7	29.618	29.527	29.549	29.565	46	52	45	49	60	50	53.0	63	40	.271	.282	.234	.262
8	29.491	29.458	29.472	29.474	48	55	51	53	68	55	58.7	70	39	.282	.261	.321	.288
9	29.480	29.337	29.343	29.387	52	68	57	59	72	65	65.3	79	44	.296	.631	.359	.429
10	29.343	29.196	29.202	29.247	55	58	59	60	71	66	65.7	78	50	.367	.310	.407	.361
11	29.139	29.201	29.244	29.201	59	60	57	63	66	60	63.0	68	50	.447	.438	.426	.437
12	29.334	29.323	29.378	29.345	56	64	60	60	80	64	68.0	80	50	.396	.382	.465	.414
13	29.455	29.451	29.447	29.451	55	65	61	62	78	67	69.0	78	55	.340	.443	.457	.413
14	29.493	29.394	29.368	29.418	62	69	66	68	84	73	75.0	85	57	.476	.507	.545	.509
15	29.355	29.260	29.392	29.302	64	74	54	71	89	63	74.3	89	62	.503	.637	.298	.479
16	29.508	29.359	29.302	29.390	54	61	56	60	71	62	64.3	72	47	.338	.403	.369	.370
17	29.121	29.039	29.100	29.087	70	73	63	76	91	69	78.7	91	59	.652	.651	.495	.599
18	29.117	29.037	29.096	29.083	52	62	60	61	69	67	65.7	75	56	.269	.462	.425	.385
19	29.073	29.064	29.120	29.086	55	59	58	59	77	62	66.0	77	52	.380	.260	.429	.360
20	29.103	29.138	29.194	29.145	54	54	53	58	60	56	58.0	64	54	.365	.338	.363	.355
21	29.177	29.193	29.223	29.198	53	55	54	56	62	58	58.7	63	51	.363	.340	.365	.356
22	29.172	29.213	29.304	29.233	54	59	55	55	63	59	59.0	65	51	.404	.447	.380	.410
23	29.435	29.463	29.440	29.446	47	58	55	54	64	58	58.7	64	48	.231	.403	.393	.342
24	29.546	29.446	29.193	29.395	57	60	58	64	70	63	65.7	70	48	.373	.385	.416	.391
25	29.530	29.400	29.424	29.451	59	68	59	62	79	66	72.3	75	48	.460	.537	.407	.468
26	29.445	29.409	29.375	29.410	59	68	62	64	74	67	68.3	78	55	.433	.604	.489	.509
27	29.447	29.373	29.351	29.390	64	69	66	68	79	71	72.7	79	60	.543	.574	.572	.563
28	29.335	29.331	29.190	29.285	67	72	68	70	80	73	74.3	80	64	.622	.677	.618	.639
29	29.152	29.109	29.088	29.116	63	71	69	74	76	71	73.7	77	67	.429	.664	.682	.592
30	29.162	29.129	29.188	29.160	68	72	70	71	82	75	76.0	83	67	.644	.650	.666	.653
Means....	29.307	29.268	29.282	29.283	55.7	61.7	56.9	60.4	71.4	61.9	64.6	....	....	.393	.436	.410	.413

of the north and northwestern lakes, at Detroit, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0=clear sky.) (10=sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.752	.392	.606	.583	W	W. SW	W	12.0	11.6	8.0	10.3	S. 82 W .	4	9	9	.144	.10
.794	.417	.738	.650	W. SW .	N. NW	Calm ..	4.1	4.0	0.0	1.9	N. 67 W .	0	9	2	.230	....
.781	.461	.674	.639	N	NW ...	Calm ..	5.4	3.0	0.0	2.6	N. 16 W .	0	7	0	.125	.30
.850	.405	.653	.639	NE	S. SW .	S	2.0	5.8	1.8	1.9	S. 8 W ..	0	8	3	.221	....
.765	.731	.856	.784	W	N	NE	0.5	4.2	0.7	1.6	North ...	9	10	4	.221	....
.853	.798	.704	.785	NE	NE	NE	0.5	3.2	0.7	1.5	N. 45 E ..	2	10	0	.962	.42
.781	.546	.646	.658	N	E	NE	2.3	0.9	0.7	1.0	N. 27 E ..	8	4	0	.116	.36
.727	.381	.743	.617	NW	N.NW.	Calm ..	2.0	3.0	0.0	1.6	N. 31 W .	0	4	0	.182	....
.592	.804*	.582	.659	W.NW.	N	N	1.6	4.0	0.5	1.8	N. 16 W .	0	1	0	.249	....
.708	.408	.636	.584	NW	SW ...	NE	0.5	5.5	1.0	1.5	S. 50 W .	3	8	7	.283	....
.776	.685	.822	.761	W	NE	Calm ..	1.7	3.2	0.0	0.8	N. 13 E ..	10	9	2	.213	....
.765	.374	.780	.640	Calm ...	W. SW	Calm ..	0.0	2.5	0.0	0.8	S. 67 W .	4	7	0	.048	....
.612	.463	.690	.588	NE	E. NE.	NE	4.0	4.2	1.2	3.0	N. 55 E ..	0	2	0	.202	....
.695	.435	.672	.601	W.NW.	SW ...	SW ...	3.0	4.8	0.8	2.4	S. 67 W .	0	2	4	.248	....
.663	.466	.519	.549	SW	N	N	2.7	6.6	5.3	3.4	N. 11 W .	0	10	0	.316	....
.653	.532	.665	.617	NE	E	SE	5.4	4.2	3.0	3.4	N. 80 E ..	0	0	0	.294	....
.727	.448	.700	.625	W	W	W	4.0	9.3	0.4	4.6	West	1	4	0	.485	....
.502	.653	.642	.599	N. NE ..	SW ...	SW ...	0.6	1.5	1.2	0.9	S. 45 W .	0	9	0		....
.761	.281	.772	.605	Calm ...	SW ...	N	0.0	6.8	4.2	1.6	S. 84 W .	0	4	7	.155	....
.756	.653	.809	.739	SW	W	S	0.2	2.5	1.3	1.0	S. 61 W .	9	9	0	.204	.20
.809	.612	.756	.726	SW	SW ...	SW ...	1.4	9.3	5.0	5.2	S. 45 W .	9	9	10	.155	.08
.934	.776	.761	.824	SW	NW ...	S	4.6	3.0	1.0	1.9	S. 68 W .	10	9	10	.244	.26
.532	.675	.816	.681	W	W	Calm ..	0.5	3.0	0.0	1.2	West	9	8	1	.009	.38
.625	.525	.723	.624	E	NE ...	Calm ..	0.3	5.5	0.0	1.9	N. 47 E ..	5	4	0	.113	....
.828	.542	.636	.669	E. NE ..	NE ...	Calm ..	0.5	0.3	0.0	0.2	N. 63 E ..	0	2	3	.216	....
.727	.720	.740	.729	E	NE ...	E	0.5	4.2	1.0	1.8	N. 57 E ..	2	3	0	.322	....
.793	.580	.754	.709	E	NE ...	E. NE.	1.0	6.3	1.0	2.7	N. 53 E ..	3	5	9	.145	....
.848	.661	.761	.757	E	SE ...	Calm ..	0.1	5.0	0.0	1.7	S. 46 E ..	2	7	7	.184	....
.511	.693	.899	.703	SE	S.SE ..	S.SE ..	6.3	4.6	2.5	4.3	S. 33 E ..	3	9	9	.225	.39
.850	.595	.768	.738	S	S	S	0.1	6.0	0.3	2.1	South ...	6	4	2	.105	.01
.733	.557	.751	.680	....	....	....	....	....	....	0.6	N. 83 W	3.6	6.2	3.0	5.516	.50

LAKE ERIE.

METEOROLOGICAL OBSERVATIONS.

Approximate height of lake above the level of the sea, 560 feet.

Location of stations and names of observers.

Monroe, Michigan.—Lat. ————; Long. ————; height above the lake, ——. Observer, John Lane.

Cleveland, Ohio.—Lat. 41° 30′ 16″ N.; Long., 81° 42′ 57″ W.; height above the lake, 85 feet. Observer, Benj. A. Stanard.

Buffalo, New York.—Lat. 42° 53′ N.; Long., 78° 55′ W.; height above the lake, 25 feet. Observer, Edward Dorr.

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Aug. 1	29.528	29.426	29.450	29.468	64.0	71.0	72.0	68.0	79.0	78.0	75.0	80.0	64.5	.543	.651	.704	.633
2	29.483	29.394	29.361	29.412	64.0	73.5	73.0	70.0	81.5	77.0	76.0	81.5	69.0	.516	.714	.757	.662
3	29.317	29.323	29.252	29.297	70.5	74.0	74.0	75.5	84.0	79.5	79.6	84.5	74.0	.677	.704	.765	.715
4	29.339	29.321	29.357	29.339	73.0	76.5	68.0	76.5	82.0	71.5	76.6	82.0	71.0	.764	.824	.638	.742
5	29.413	29.411	29.480	29.435	68.0	71.0	69.0	70.0	78.0	73.0	73.6	80.5	66.5	.625	.664	.655	.648
6	29.566	29.552	29.519	29.546	66.5	71.5	71.5	71.5	79.5	76.5	75.8	80.0	65.0	.516	.664	.704	.628
7	29.532	29.441	29.394	29.455	72.5	79.0	78.5	75.5	88.5	83.5	82.5	89.5	78.0	.757	.861	.906	.841
8	29.402	29.311	29.235	29.316	74.5	77.5	78.0	78.0	86.5	85.0	83.2	88.5	77.0	.806	.820	.863	.829
9	29.216	29.207	29.318	29.247	71.5	75.0	67.0	76.5	84.0	72.0	77.5	86.0	70.0	.704	.746	.595	.681
10	29.402	29.367	29.339	29.369	67.0	73.0	72.0	75.0	81.5	77.0	77.5	82.0	70.5	.554	.697	.718	.623
11	29.324	29.246	29.291	29.287	71.0	76.5	75.0	75.0	88.5	81.0	81.5	89.0	73.0	.704	.750	.787	.747
12	29.471	29.514	29.542	29.509	66.5	65.0	65.0	71.0	80.5	73.0	74.8	83.0	66.5	.590	.410	.510	.503
13	29.661	29.552	29.507	29.573	63.5	67.0	67.0	70.5	77.0	74.0	73.8	77.0	64.5	.492	.527	.568	.521
14	29.367	29.241	29.348	29.319	63.5	66.0	66.0	68.0	68.0	68.0	68.0	74.0	68.0	.526	.612	.612	.583
15	29.506	29.538	29.575	29.539	52.0	57.5	58.0	55.5	69.0	62.0	62.2	70.5	51.5	.342	.321	.429	.364
16	29.677	29.717	29.699	29.697	52.0	60.0	58.0	57.0	70.0	63.0	63.3	71.0	52.5	.322	.385	.416	.375
17	29.528	29.572	29.572	29.557	57.0	63.5	64.0	61.5	73.0	72.5	69.0	73.0	59.5	.406	.449	.483	.446
18	29.501	29.464	29.465	29.476	60.5	67.5	68.0	64.5	77.5	74.0	72.0	78.0	62.0	.474	.538	.604	.539
19	29.468	29.421	29.435	29.431	64.5	68.5	68.5	67.5	78.0	75.0	73.5	78.0	65.0	.566	.569	.609	.581
20	29.512	29.469	29.452	29.478	63.0	71.5	70.0	66.5	82.5	76.5	75.2	84.0	65.0	.529	.622	.646	.599
21	29.472	29.324	29.307	29.368	65.5	72.0	71.0	68.5	80.5	74.0	74.3	80.5	63.0	.587	.670	.718	.658
22	29.240	29.206	29.246	29.230	70.0	72.5	68.5	72.0	80.0	75.0	75.6	81.5	68.0	.706	.696	.609	.670
23	29.425	29.432	29.569	29.475	62.5	68.5	61.0	67.0	79.5	68.0	71.5	80.5	62.5	.506	.549	.442	.499
24	29.690	29.635	29.610	29.645	62.0	64.0	64.0	66.0	71.0	69.0	68.6	71.0	58.5	.502	.503	.529	.511
25	29.561	29.451	29.419	29.480	63.0	72.5	72.0	66.0	80.5	76.5	74.3	80.5	61.5	.536	.690	.724	.650
26	29.419	29.338	29.290	29.349	66.5	75.5	73.0	70.0	84.5	77.5	77.3	84.5	67.5	.603	.760	.751	.705
27	29.300	29.206	29.243	29.249	70.5	75.0	65.0	73.0	79.5	67.0	73.2	79.5	66.5	.712	.807	.591	.703
28	29.298	29.312	29.311	29.307	64.0	67.5	67.0	66.5	79.0	71.5	72.3	82.0	60.5	.563	.519	.601	.561
29	29.443	29.470	29.533	29.482	62.0	68.0	64.5	66.0	75.5	69.0	70.2	78.0	63.0	.502	.584	.546	.544
30	29.660	29.615	29.555	29.610	61.5	62.5	61.0	65.0	72.0	68.0	68.3	73.0	62.0	.499	.439	.492	.477
31	29.460	29.320	29.141	29.307	60.5	70.5	69.0	63.0	77.0	72.5	70.8	79.0	60.5	.494	.668	.661	.608
Means....	29.457	29.412	29.413	29.427	64.9	70.1	72.5	72.1	78.9	73.8	74.9	....	....	.568	.626	.633	.609
Sept. 1	29.049	29.049	29.248	29.115	68.0	61.5	50.5	70.5	67.5	55.0	64.3	73.5	55.0	.651	.485	.307	.481
2	29.432	29.441	29.462	29.445	44.0	54.0	52.0	48.0	62.0	54.5	64.8	62.0	44.0	.236	.312	.355	.301
3	29.557	29.477	29.478	29.470	57.0	62.5	63.0	60.0	70.5	69.0	66.5	73.0	53.0	.426	.459	.495	.460
4	29.511	29.498	29.500	29.503	58.0	69.0	67.5	63.0	77.0	73.0	71.0	78.0	62.0	.416	.601	.599	.539
5	29.511	29.393	29.404	29.436	65.0	72.0	69.0	70.0	80.5	72.0	74.2	81.0	67.5	.550	.670	.668	.629
6	29.390	29.341	29.309	29.346	69.5	74.0	71.5	74.0	77.5	74.5	75.3	81.5	71.0	.660	.792	.740	.731
7	29.331	29.314	29.334	29.326	69.0	73.0	71.0	71.0	75.5	72.5	73.0	75.0	70.0	.682	.778	.738	.733
8	29.344	29.420	29.542	29.435	68.5	61.0	59.0	71.0	73.5	63.0	69.2	75.0	63.0	.662	.370	.447	.493
9	29.665	29.625	29.622	29.637	58.5	63.0	60.0	61.5	70.0	65.0	65.5	70.0	57.5	.451	.482	.451	.461
10	29.631	29.564	29.540	29.578	55.0	66.5	67.0	56.5	75.5	71.5	67.8	75.0	55.0	.413	.530	.601	.515
11	29.445	29.339	29.319	29.367	67.5	75.0	69.0	72.0	82.0	71.5	75.2	82.0	70.0	.612	.773	.675	.687
12	29.440	29.573	29.671	29.561	59.5	56.0	54.0	63.5	65.0	59.0	62.5	70.5	59.0	.456	.330	.351	.379
13	29.767	29.686	29.654	29.702	50.0	55.5	56.0	54.5	61.5	60.0	58.7	62.0	49.0	.301	.361	.396	.353
14	29.652	29.597	29.625	29.634	52.0	65.0	65.0	53.5	71.5	69.0	64.7	71.5	51.0	.368	.530	.564	.487
15	29.584	29.483	29.620	29.562	61.0	73.5	60.0	62.5	84.0	62.0	69.5	84.0	62.0	.504	.683	.491	.559
16	29.609	29.553	29.492	29.551	58.0	64.0	62.0	60.0	67.5	66.0	64.5	67.5	59.0	.456	.549	.502	.502
17	29.353	29.229	29.082	29.221	66.5	71.0	70.0	69.5	75.5	72.5	72.5	77.0	65.0	.610	.698	.699	.669
18	29.352	29.205	29.581	29.379	64.5	63.0	54.5	66.5	70.0	57.5	64.7	72.0	57.5	.533	.499	.378	.470
19	29.619	29.594	29.596	29.603	54.0	61.0	57.0	56.0	66.5	61.0	61.2	67.0	53.5	.391	.463	.412	.422
20	29.596	29.547	29.548	29.563	51.5	62.5	61.5	53.0	69.5	65.5	62.7	72.5	53.5	.360	.472	.492	.441
21	29.643	29.586	29.576	29.602	56.0	65.0	66.5	57.0	72.0	69.0	63.0	72.0	56.5	.436	.524	.617	.526
22	29.565	29.517	29.508	29.530	58.0	68.0	68.0	62.0	75.0	71.0	69.3	75.5	60.0	.437	.591	.644	.557
23	29.517	29.493	29.257	29.423	59.0	69.0	67.5	61.5	77.0	70.0	69.5	79.5	60.0	.467	.601	.639	.569
24	29.497	29.555	29.537	29.539	51.5	51.5	53.5	53.5	60.5	57.5	57.2	70.5	51.5	.354	.262	.357	.324
25	29.559	29.594	29.475	29.546	47.5	58.0	57.5	50.0	65.0	63.0	59.3	65.0	45.0	.296	.389	.400	.362
26	29.512	29.483	29.468	29.487	49.0	59.0	60.0	51.0	68.5	66.5	62.0	68.5	50.0	.321	.373	.431	.375
27	29.457	29.401	29.383	29.413	49.0	61.5	65.0	50.0	70.5	68.5	63.0	71.0	49.0	.335	.415	.570	.440
28	29.402	29.325	29.340	29.356	61.5	67.5	66.0	64.0	73.5	68.0	68.7	75.0	63.0	.385	.592	.606	.528
29	29.384	29.395	29.436	29.405	60.5	61.0	60.0	61.5	67.0	62.0	63.5	69.0	59.5	.514	.457	.490	.487
30	29.448	29.461	29.461	29.456	62.5	65.0	64.0	66.0	69.0	65.5	66.8	69.0	57.0	.519	.564	.576	.553
Means....	29.495	29.491	29.469	29.485	58.4	64.2	65.6	61.1	71.3	65.9	66.1	....	....	.473	.520	.522	.505

of the north and northwestern lakes, at Monroe Piers, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.				7 a. m.	2 p. m.	9 p. m.		
											°						
.793	.657	.734	.725	N	SE ...	S	2	12	12	6.8	S. 25 E..		1	2	9	......	....
.704	.667	.817	.733	N.NE ..	E	E	4	4	4	3.4	N. 69 E..		5	3	5	......	....
.769	.605	.760	.7[illegible]	SE	S	SE ...	25	25	12	19.3	S. 27 E..		5	4	4	......	....
.8[illegible]8	.730	.897	.798	S	S	S	25	12	12	16.3	South ..		9	7	9	......	....
.653	.693	.807	.714	W	SW ...	SW ...	12	4	2	5.7	S. 75 W.		9	4	1	......	.50
.566	.659	.772	.666	NE	E	SE ...	12	4	25	10.7	S. 73 E..		2	2	3	......	....
.859	.641	.790	.763	S.SW ..	S.SW.	SE ...	4	12	12	7.8	S. 6 E...		1	4	1	......	....
.841	.650	.718	.736	S	S	S.SW.	12	25	25	20.3	S. 9 W..		2	4	2	......	....
.772	.640	.758	.713	W	SW ...	SW ...	12	25	4	12.7	S. 58 W.		5	5	3	......	....
.639	.648	.774	.687	NE	E	E.SE .	12	4	12	8.0	N. 81 E..		4	1	1	......	....
.812	.557	.744	.704	S.SW ..	SW ..	W.SW	4	25	4	10.8	S. 45 W..		3	3	5	......	....
.772	.394	.629	.598	W NW.	W	N	4	4	4	3.2	N. 54 W.		5	3	0	......	....
.660	.569	.677	.635	NE	E	SE ...	12	4	12	7.0	East		1	4	3	......	....
.768	.895	.895	.832	W	NW...	W.NW	2	4	2	2.5	N. 61 W.		10	10	9	......	....
.776	.453	.772	.667	NW....	NW...	W	12	12	2	8.6	N. 48 W.		0	4	0	......	.20
.692	.625	.723	.646	N. NW.	SE ...	W.NW	12	4	2	3.3	N. 22 W.		1	1	0	......	....
.743	.566	.605	.638	W	SE ...	S	2	4	4	2.3	S. 7 E ..		3	3	1	......	....
.781	.572	.720	.658	W.SW.	SE ...	S	2	4	4	2.7	S. 7 E. ..		7	4	1	......	....
.842	.593	.702	.712	W	E	SE ...	2	4	12	4.5	S. 51 E..		1	2	0	......	....
.814	.561	.708	.694	W.SW.	SE ...	SE ...	4	2	4	1.9	S. 5 E...		0	1	0	......	....
.844	.644	.856	.781	NW....	NE ...	S	2	4	25	7.0	S. 4 E...		2	2	10	......	....
.900	.681	.702	.761	S.SW ..	S.SW.	NW...	12	12	12	7.3	S. 52 W.		9	6	2	......	.78
.764	.545	.647	.651	NW....	NW...	NE ...	4	4	35	12.0	N. 33 E..		1	6	0	......	....
.786	.663	.747	.732	NE	E	E	12	25	4	12.8	N. 77 E..		0	1	0	......	....
.838	.663	.794	.765	W	SE....	S	2	2	4	1.8	S. 7 W ..		1	1	1	......	....
.823	.642	.797	.754	W.SW.	S	S	4	12	4	6.0	S. 12 W.		4	2	0	......	....
.878	.802	.898	.858	S	S	W	12	12	4	8.1	S. 10 W.		9	5	3	......	.88
.866	.522	.780	.723	NW....	W	W.SW	4	4	4	3.5	N. 83 W.		9	2	0	......	.25
.786	.662	.771	.733	N	E.SE .	NE ...	4	4	12	5.5	N. 48 E..		3	7	4	......	....
.809	.559	.719	.695	NE	E	E	4	4	12	6.5	N. 82 E..		6	1	2	......	....
.858	.710	.829	.799	W	E.....	W.NW	2	4	2	0.2	N. 14 E..		8	5	10	......	....
.782	.589	.789	.720	....	....	....	....	....	....	3.0	S. 14 E..		4.0	3.5	2.8	......	2.61
.873	.697	.711	.760	W.SW.	W.NW	NW...	4	45	35	27.0	N. 60 W.		10	5	2	......	.01
.704	.561	.836	.700	NE	E.SE .	W.NW	25	4	2	8.7	N. 49 E..		1	2	0	......	.21
.822	.615	.700	.712	S	S	S	4	12	12	9.3	South ...		0	0	0	......	....
.723	.648	.739	.703	S.SW ..	S	S	12	4	4	6.5	S. 14 W.		0	1	2	......	....
.751	.644	.852	.749	S	SE ...	SW ...	4	12	12	7.0	South ...		3	3	9	......	....
.787	.840	.857	.828	S.SW ..	SW ..	SE ...	12	2	4	5.2	S. 12 W .		5	7	9	......	.02
.899	.882	.925	.902	S.SW ..	S.SW	S.SW.	12	12	12	12.0	S. 22 W		10	7	9	......	.44
.874	.449	.776	.700	W	W. SW	N.NW	12	12	4	5.7	S. 64 W.		10	2	0	......	.32
.826	.658	.731	.738	N. NE..	E	E	12	4	4	5.6	N. 49 E..		1	1	0	......	....
.904	.600	.780	.761	W	E	E	2	4	12	4.7	East		....	0	0	......	....
.782	.708	.875	.788	W.SW .	W.SW	W.SW	4	4	4	4.0	S. 68 W.		9	2	5	......	....
.778	.535	.703	.672	NW....	NW...	N	12	12	35	18.3	N. 18 W.		4	6	0	......	.34
.709	.662	.765	.712	NE	NE ...	NE ...	35	25	35	31.7	N. 45 E..		7	5	3	......	....
.899	.688	.796	.794	N	E	E	2	4	2	2.1	N. 71 E..		1	1	0	......	....
.859	.586	.884	.776	W	W	NE ...	2	4	12	2.9	N. 17 E..		1	5	10	......	....
.880	.817	.786	.828	N.NE ..	NE ..	E.NE .	12	25	25	16.0	N. 70 E..		10	9	0	......	.25
.847	.791	.877	.838	E	E.NE .	E	4	4	12	6.6	N. 85 E .		7	5	5	......	....
.727	.680	.812	.740	W	SW...	W	12	35	4	15.7	S. 59 W.		9	5	1	......	.53
.872	.713	.769	.785	W	E	N	2	2	2	0.7	North ...		9	7	1	......	.06
.898	.654	.784	.779	W. SW.	S	S	4	4	4	3.4	S. 21 W.		0	1	0	......	....
.936	.668	.871	.825	W	E	E	2	4	4	2.0	East		0	0	0	......	....
.774	.681	.850	.768	SW	E	SE ...	2	4	4	2.3	S. 52 E..		0	1	0	......	....
.855	.648	.873	.792	W.NW.	S	S	2	12	2	4.5	S. 8 W..		3	4	8	......	....
.865	.497	.753	.705	N	N	N	35	25	2	20.7	North ...		3	4	1	......	.43
.820	.631	.696	.716	W	SE ...	S	2	4	4	2.3	S. 7 E...		0	0	0	......	....
.859	.536	.663	.686	W	E.SE .	SE ...	2	4	4	2.1	S. 46 E..		0	0	0	......	....
.927	.573	.819	.773	N	E	SE....	2	2	12	4.0	S. 57 E..		....	2	3	......	....
.468	.717	.870	.685	S.SW...	S	W	4	2	2	2.2	S. 32 W.		7	1	0	......	....
.941	.690	.884	.838	N	NW...	N	4	2	4	3.1	N. 9 W..		10	8	3	......	....
.812	.797	.917	.842	E.SE. .	E	E	4	4	12	6.6	S. 86 E..		5	6	10	......	....
.822	.662	.803	.762	....	....	....	....	....	....	1.1	N. 30 E..		4.2	3.3	3.7	......	2.61

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Oct. 1	29. 436	29. 441	29. 430	29. 436	65. 0	66. 5	67. 0	66. 5	70. 0	68. 0	68. 2	70. 0	65. 0	. 597	. 603	. 648	. 616
2	29. 463	29. 422	29. 429	29. 438	66. 0	71. 0	68. 0	68. 0	78. 0	69. 5	71. 8	78. 0	66. 0	. 612	. 664	. 665	. 647
3	29. 463	29. 423	29. 367	29. 418	66. 0	70. 0	68. 0	67. 0	74. 0	71. 0	70. 7	77. 5	66. 5	. 626	. 679	. 644	. 649
4	29. 221	29. 363	29. 595	29. 393	68. 0	58. 0	50. 0	69. 0	65. 5	55. 0	63. 2	71. 0	55. 0	. 671	. 383	. 295	. 449
5	29. 815	29. 745	29. 689	29. 750	46. 0	54. 5	53. 5	49. 0	61. 0	58. 0	56. 0	61. 0	47. 0	. 271	. 339	. 350	. 320
6	29. 492	29. 273	29. 193	29. 352	53. 5	61. 5	61. 0	58. 5	67. 0	69. 0	64. 8	70. 0	56. 5	. 358	. 472	. 430	. 420
7	29. 258	29. 212	29. 274	29. 248	65. 5	70. 0	68. 0	68. 5	78. 5	72. 0	73. 0	80. 0	66. 5	. 588	. 619	. 631	. 613
8	29. 237	29. 181	29. 242	29. 220	66. 5	70. 0	68. 0	70. 5	76. 5	69. 0	72. 0	77. 0	69. 0	. 597	. 646	. 671	. 635
9	29. 507	29. 422	29. 543	29. 491	55. 0	54. 0	54. 0	57. 5	57. 0	56. 0	56. 8	69. 0	55. 0	. 400	. 378	. 391	. 389
10	29. 490	29. 400	29. 461	29. 450	50. 0	49. 0	47. 0	51. 5	50. 0	48. 5	50. 0	56. 0	47. 0	. 341	. 335	. 303	. 326
11	29. 597	29. 599	29. 598	29. 598	43. 5	46. 0	44. 0	45. 5	52. 0	46. 5	48. 0	52. 0	44. 0	. 256	. 232	. 255	. 248
12	29. 555	29. 437	29. 381	29. 458	42. 5	51. 5	51. 0	43. 5	57. 5	53. 5	51. 5	57. 5	42. 0	. 259	. 301	. 341	. 300
13	29. 361	29. 313	29. 384	29. 353	43. 5	56. 5	51. 5	44. 5	62. 5	53. 5	53. 5	62. 0	42. 5	. 269	. 377	. 355	. 334
14	29. 446	29. 495	29. 592	29. 511	45. 5	47. 5	43. 5	47. 5	51. 5	47. 0	48. 7	55. 0	42. 5	. 278	. 276	. 237	. 264
15	29. 641	29. 571	29. 450	29. 554	36. 5	49. 0	48. 0	37. 5	52. 5	52. 0	47. 3	57. 0	36. 0	. 203	. 302	. 282	. 262
16	29. 310	29. 203	29. 118	29. 210	45. 0	47. 0	46. 0	47. 0	50. 0	47. 5	48. 2	52. 0	45. 5	. 273	. 283	. 291	. 282
17	29. 510	29. 558	29. 638	29. 569	39. 5	45. 0	44. 0	40. 5	52. 0	46. 0	46. 1	56. 0	38. 0	. 229	. 207	. 262	. 232
18	29. 677	29. 547	29. 436	29. 553	43. 0	54. 0	51. 5	46. 0	59. 5	56. 5	54. 0	60. 5	40. 0	. 238	. 345	. 315	. 299
19	29. 392	29. 463	29. 609	29. 488	48. 0	43. 0	38. 5	52. 5	41. 5	51. 5	48. 5	56. 0	41. 5	. 276	....	. 063	. 170
20	29. 630	29. 440	29. 233	29. 434	34. 0	44. 0	47. 0	35. 5	52. 5	52. 0	46. 7	52. 5	33. 0	. 176	. 177	. 257	. 203
21	28. 983	28. 935	28. 992	28. 970	47. 0	52. 0	46. 0	51. 0	59. 5	53. 0	54. 5	60. 5	48. 5	. 270	. 303	. 219	. 264
22	29. 257	29. 342	29. 496	29. 365	37. 0	39. 5	37. 0	40. 5	47. 0	39. 5	42. 3	53. 0	39. 5	. 175	. 229	. 188	. 197
23	29. 760	29. 692	29. 553	29. 668	35. 0	43. 0	41. 0	37. 6	47. 5	44. 0	43. 0	47. 5	35. 5	. 171	. 219	. 218	. 202
24	29. 415	29. 418	29. 613	29. 482	44. 0	51. 5	40. 0	49. 0	58. 0	41. 5	49. 5	60. 0	41. 5	. 223	. 292	. 228	. 248
25	29. 800	29. 841	29. 821	29. 821	32. 5	32. 5	31. 0	34. 5	33. 5	32. 0	33. 3	41. 5	31. 5	. 158	. 171	. 162	. 164
26	29. 677	29. 577	29. 464	29. 573	29. 5	34. 5	30. 0	31. 0	40. 5	32. 5	34. 7	41. 5	29. 5	. 146	. 122	. 138	. 135
27	29. 383	29. 332	29. 374	29. 363	29. 5	33. 5	37. 5	25. 5	47. 5	41. 5	38. 2	50. 5	24. 0	....	. 138	. 172	. 155
28	29. 380	29. 303	29. 344	29. 342	36. 5	42. 0	41. 0	39. 5	48. 5	45. 0	44. 3	48. 5	39. 0	. 177	. 182	. 205	. 188
29	29. 520	29. 542	29. 601	29. 554	34. 5	46. 5	46. 0	35. 5	56. 5	49. 0	47. 0	57. 5	35. 0	. 187	. 184	. 271	. 214
30	29. 477	29. 369	29. 413	29. 420	45. 5	54. 5	49. 0	49. 5	67. 5	54. 0	57. 0	68. 0	46. 5	. 252	. 252	. 282	. 262
31	29. 451	29. 307	29. 358	29. 372	46. 0	55. 5	50. 0	52. 0	67. 5	58. 0	59. 1	68. 5	49. 5	. 232	. 281	. 255	. 256
Means....	29. 503	29. 424	29. 442	29. 456	45. 7	51. 8	49. 6	49. 4	57. 5	52. 7	53. 2	....	....	. 317	. 333	. 323	. 321
Nov. 1	29. 409	29. 288	29. 293	29. 330	45. 5	54. 5	51. 0	51. 0	64. 5	56. 0	57. 2	66. 0	50. 0	. 232	. 292	. 308	. 277
2	29. 296	29. 139	29. 222	29. 219	47. 0	55. 5	39. 5	51. 0	60. 5	41. 5	51. 0	56. 5	41. 5	. 270	. 375	. 216	. 287
3	29. 480	29. 517	29. 576	29. 524	37. 0	38. 0	38. 0	39. 5	45. 0	41. 5	42. 0	45. 0	38. 0	. 188	. 142	. 183	. 171
4	29. 606	29. 484	29. 433	29. 508	39. 5	44. 0	43. 5	43. 0	49. 0	47. 0	46. 3	49. 5	40. 0	. 197	. 197	. 237	. 210
5	29. 287	29. 345	29. 639	29. 423	37. 5	35. 0	34. 0	41. 0	43. 0	35. 5	39. 8	48. 0	35. 5	. 179	. 139	. 176	. 165
6	29. 540	29. 380	29. 307	29. 409	25. 0	34. 5	34. 0	27. 0	40. 5	37. 5	35. 0	41. 0	25. 5	. 112	. 122	. 150	. 128
7	29. 424	29. 509	29. 546	29. 493	32. 0	31. 0	27. 0	35. 0	35. 0	31. 0	33. 7	38. 0	30. 5	. 142	. 128	. 101	. 124
8	29. 500	29. 466	29. 564	29. 510	24. 5	35. 0	33. 0	26. 5	39. 5	35. 5	33. 8	39. 5	25. 0	. 109	. 158	. 156	. 141
9	29. 648	29. 604	29. 642	29. 631	27. 5	40. 5	37. 5	29. 0	48. 0	40. 0	39. 0	50. 0	27. 0	. 133	. 154	. 192	. 160
10	29. 662	29. 696	29. 296	29. 551	30. 0	39. 5	42. 0	32. 0	47. 0	44. 0	41. 0	47. 0	31. 5	. 144	. 144	. 241	. 176
11	29. 386	29. 184	29. 197	29. 256	38. 5	44. 5	47. 0	42. 0	51. 5	51. 0	48. 2	52. 0	41. 0	. 188	. 201	. 270	. 220
12	29. 535	29. 508	29. 535	29. 526	39. 0	40. 0	34. 5	41. 5	44. 0	38. 0	41. 2	50. 5	37. 5	. 206	. 195	. 154	. 185
13	29. 667	29. 583	29. 581	29. 610	30. 5	39. 0	40. 0	33. 0	46. 0	43. 5	40. 8	48. 5	31. 5	. 141	. 147	. 202	. 163
14	29. 609	29. 717	29. 823	29. 716	37. 5	38. 0	31. 5	41. 5	42. 0	34. 5	39. 3	49. 0	34. 5	. 172	. 177	. 142	. 164
15	30. 036	30. 059	30. 037	30. 054	28. 0	29. 5	31. 5	30. 0	35. 5	34. 0	33. 2	38. 0	26. 5	. 130	. 094	. 148	. 124
16	29. 906	29. 824	29. 723	29. 818	37. 5	40. 5	41. 5	39. 5	43. 5	43. 5	42. 2	43. 5	33. 0	. 198	. 212	. 236	. 215
17	29. 683	29. 724	29. 801	29. 736	45. 5	45. 0	43. 5	47. 0	47. 5	44. 5	46. 3	50. 0	43. 0	. 271	. 266	. 269	. 269
18	29. 784	29. 600	29. 468	29. 600	41. 0	42. 5	43. 0	42. 0	43. 5	44. 0	43. 2	44. 0	41. 0	. 224	. 259	. 264	. 249
19	29. 254	29. 226	29. 152	29. 210	45. 5	44. 5	43. 0	46. 5	45. 5	44. 0	45. 3	46. 0	42. 5	. 291	. 280	. 264	. 278
20	29. 119	....	....	29. 119	35. 0	....	....	37. 0	....	....	37. 0	....	....	. 178	....	....	. 178
Means....	29. 540	29. 544	29. 517	....	36. 2	40. 6	38. 1	38. 8	44. 8	41. 4	41. 7	....	....	. 185	. 194	. 206	. 194

of the north and northwestern lakes, at Monroe Piers, Michigan.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.917	.823	.947	.898	SW	E.SE	E	2	2	2	1.1	S. 47 E.	4	10	10	......	0.23
.895	.693	.922	.836	S.SW	SW	SW	4	4	2	3.2	S. 36 W	9	5	10	......	0.02
.946	.810	.850	.868	SW	SW	S	4	12	4	6.3	S. 37 W.	10	5	1	......	0.95
.947	.609	.681	.746	S	W.SW	W	35	35	2	19.8	S. 35 W.	9	4	0	......	0.50
.781	.632	.727	.713	N	SE	E	12	4	4	3.8	N. 36 E.	1	1	0	......	....
.705	.715	.607	.676	S	S	SW	35	12	45	28.3	S. 22 W.	9	5	2	......	....
.844	.635	.804	.761	S.SW	SW	S	12	25	12	15.3	S. 29 W.	4	6	2	......	....
.800	.708	.947	.818	S	S. SW.	W	25	35	12	21.0	S. 24 W.	4	8	10	......	....
.844	.812	.872	.843	NW	N	N.NE	4	12	4	6.2	N. 4 W.	10	10	10	......	0.67
.895	.927	.888	.903	N	N	W.NW	45	35	12	28.3	N. 8 W.	10	10	9	......	0.33
.841	.598	.807	.745	W.NW.	N. NW	NW	12	4	4	6.3	N. 53 W.	9	5	1	......	0.15
.917	.637	.832	.795	N	N.E	NE	12	4	4	6.2	N. 18 E.	1	6	0	......	....
.919	.667	.865	.817	N	SE	N. NW	2	4	2	0.7	N. 63 E.	1	1	0	......	....
.848	.728	.734	.766	NW	NW	N	4	4	12	6.7	N. 16 W.	4	8	1	......	....
.904	.763	.727	.798	N	NE	S	4	2	4	0.7	N. 45 E.	1	2	3	......	....
.847	.786	.886	.843	SW	SW	W	25	45	2	23.7	S. 46 W.	10	10	10	......	....
.911	.535	.843	.763	W.NW.	W	NW	12	4	2	5.9	N. 70 W.	5	5	0	......	0.10
.767	.678	.689	.711	S.SW	S	S	25	2	12	12.7	S. 14 W.	1	5	2	......	....
.696	......	.166	.421	W	W	W	4	45	2	17.0	West	8	8	4	......	....
.849	.447	.660	.652	W	S	S	2	25	45	23.3	S. 2 W.	8	5	5	......	....
.722	.505	.444	.620	S	SW	W	12	45	60	34.0	S. 65 W.	9	4	10	......	0.01
.692	.911	.773	.792	W	W	W	12	45	4	20.3	West	10	9	1	......	0.06
.762	.663	.776	.733	W.NW.	S	S	4	4	45	17.0	S. 4 W.	2	7	9	......	....
.638	.612	.869	.703	S.SW	SW	NW	4	45	12	16.7	S. 57 W.	7	10	10	......	....
.794	.894	.896	.861	NW	NW	N	12	12	12	11.3	N. 31 W.	10	10	10	......	0.01
.841	.477	.748	.689	N	N	N	12	4	4	6.7	North	5	2	1	......	0.06
......	.419	.655	.537	W	W.SW	W	2	12	4	5.9	S. 75 W.	1	3	3	......	....
.729	.534	.684	.649	S	S	W	25	25	4	17.0	S. 5 W.	5	10	3	......	....
.899	.405	.781	.695	SW	SW	S	4	35	2	13.5	S. 43 W.	2	3	5	......	....
.713	.376	.674	.588	S	SW	SW	12	45	2	18.7	S. 36 W.	10	5	3	......	....
.598	.424	.529	.517	S.SW	S.SW.	S.SW.	12	25	4	13.5	S. 23 W.	0	4	0	......	....
.815	.650	.756	.734	....	....	....	....	....	....	8.1	S. 51 W.	5.7	6.0	4.3	......	3.09
.622	.487	.687	.599	S	S. SW.	S	4	12	12	9.1	S. 10 W.	0	0	5	......	....
.722	.713	.826	.754	W	W	W	2	45	45	30.7	West	10	8	8	......	....
.773	.465	.699	.646	W	NW	N	12	12	4	8.0	N. 59 W.	8	5	1	......	0.37
.709	.709	.734	.717	SE	E	SE	12	4	4	6.3	S. 53 E.	4	6	3	......	....
.695	.557	.849	.700	S	N	NW	2	25	12	11.0	N. 15 W.	6	8	5	......	....
.761	.482	.669	.637	NW	SE	E.SE	2	4	12	4.7	S. 64 E.	1	5	10	......	0.02
.698	.628	.582	.636	NE	N	NW	45	25	4	22.0	N. 26 E.	6	4	3	......	0.01
.758	.677	.750	.728	W	W.NW	W	4	12	2	5.9	N. 75 W.	0	1	0	......	....
.831	.460	.776	.689	NW	N	W	4	4	2	2.0	N. 35 W.	3	8	9	......	....
.794	.447	.836	.692	W.SW.	SE	SE	2	4	12	5.1	S. 38 W.	0	0	1	......	....
.706	.530	.722	.653	S.SE	S	S	12	12	12	11.8	S. 7 E.	9	2	10	......	....
.784	.677	.673	.711	W	S.SW.	W	2	25	12	11.2	S. 46 W.	9	3	9	......	0.01
.752	.471	.713	.645	SW	S	S	12	12	4	8.7	S. 19 W.	0	0	10	......	....
.657	.661	.716	.678	SW	N. NW	N	4	25	12	11.7	N. 21 W.	9	10	2	......	....
.782	.460	.760	.667	N.NE	NE	NE	25	35	45	34.7	N. 40 E.	3	5	10	......	....
.818	.753	.834	.802	E	E	SE	35	12	2	16.0	S. 88 E.	9	3	10	......	....
.813	.811	.819	.848	W	NW	NW	2	2	2	1.9	N. 60 W.	10	10	10	......	0.02
.794	.917	.918	.876	NE	NE	NE	4	2	2	2.7	N. 45 E.	10	10	10	......	0.10
.922	.920	.918	.920	N	N	N	2	12	25	13.0	North	10	10	10	......	0.72
.807	......	......	.807	NW	....	....	25	....	....	25.0	N. 45 W.	10	....	....	......	0.80
.766	.633	.767	.722	....	....	....	....	....	....	2.5	N. 9 W.	5.9	4.6	6.6	......	2.45

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.351	29.517	29.669	29.512	29.0	35.0	30.5	30.0	38.0	32.5	33.5	40.0	30.0	.149	.165	.148	.154
2	29.758	29.671	29.515	29.648	24.0	31.5	28.0	25.5	34.0	30.0	29.8	34.0	23.0	.112	.149	.130	.130
3	29.346	29.335	29.485	29.389	25.5	28.5	28.5	26.5	31.0	30.5	29.3	32.0	25.0	.126	.128	.133	.129
4	29.429	29.319	29.255	29.334	25.0	34.5	30.5	26.5	38.5	33.5	32.8	40.5	25.5	.118	.148	.136	.134
5	29.300	29.128	29 109	29.179	25.5	31.5	25.0	27.0	37.5	28.0	30.8	39.0	25.5	.121	.109	.100	.110
6	29.337	29.427	29.535	29.433	11.0	15.5	10.5	12.0	17.5	12.0	13.8	28.0	11.0	.049	.065	.053	.056
7	29.645	29.623	29.648	29.639	3.5	22.5	12.5	6.0	25.0	14.0	15.0	25.0	5.0	.050	.092	.060	.067
8	29.499	29.355	29.478	29.444	17.5	31.5	18.5	19.0	35.0	20.0	24.7	35.5	10.0	.079	.138	.084	.100
9	29.635	29.615	29.621	29.624	22.5	29.0	27.0	24.0	31.5	29.0	28.2	31.5	14.0	.104	.131	.124	.120
10	29.567	29.433	29.460	29.487	21.5	39.5	34.5	23.0	50.5	39.0	37.5	52.0	21.5	.099	.099	.141	.113
11	29.449	29.345	29.382	29.392	34.0	47.0	43.0	37.5	57.5	46.5	47.0	59.0	34.0	.150	.185	.232	.189
12	29.483	29.426	29.396	29.435	39.5	40.5	37.0	42.0	47.5	39.0	42.8	47.5	38.0	.211	.161	.194	.189
13	29.274	29.295	29.348	29.306	38.0	50.5	51.0	39.5	54.0	53.0	48.8	54.0	38.0	.210	.322	.348	.293
14	29.332	29.279	29.173	29.261	52.0	55.0	55.0	53.5	57.0	56.5	55.7	57.0	49.0	.368	.407	.413	.396
15	29.112	29.062	29.030	29.068	49.0	39.0	33.5	51.0	41.5	35.0	42.5	56.5	35.0	.321	.206	.173	.233
16	29.109	29.126	29.426	29.220	30.0	31.5	27.0	31.5	34.5	29.0	31.7	40.0	28.5	.150	.143	.124	.139
17	29.701	29.730	30.000	29.810	23.5	26.5	19.5	25.0	29.5	20.0	25.2	30.0	21.0	.109	.109	.089	.102
18	29 922	29.583	29.506	29.670	17.5	32.0	27.5	19.0	35.5	21.0	28.2	37.0	15.5	.079	.136	.121	.112
19	29.632	29.816	30.013	29.820	28.5	29.5	16.0	30.5	33.0	18.0	27.2	36.0	18.0	.134	.124	.067	.108
20	30.101	30.083	29.978	30.054	8.0	20.0	17.5	9.0	22.0	19.0	16.7	23.0	8.0	.051	.085	.079	.072
21	29.777	29.606	29.583	29.655	16.5	25.0	30.0	18.0	27.0	32.0	25.7	32.0	13.0	.075	.112	.144	.110
22	29.535	29.420	29.432	29.462	35.0	41.5	40.5	37.0	45.5	42.5	41.7	45.5	32.0	.178	.210	.226	.205
23	29.576	29.591	29.622	29.596	34.5	38.5	32.0	35.5	41.5	34.0	37.0	42.0	34.0	.187	.195	.155	.179
24	29.486	29.417	29.396	29.433	34.5	51.5	47.0	35.5	55.5	48.0	46.3	57.5	33.0	.187	.328	.310	.275
25	29.372	29.191	29.176	29.246	48.0	49.5	45.5	49.5	53.5	47.0	50.0	53.5	46.5	.350	.302	.286	.313
26	29.093	28.955	28.972	29.007	39.5	49.0	43.0	40.5	53.5	45.0	46.3	53.5	39.0	.230	.288	.251	.256
27	29.283	29.237	29.237	29.252	35.0	38.0	33.5	36.5	39.5	35.0	37.0	45.0	34.0	.184	.210	.173	.189
28	29.291	29.213	29.165	29.223	27.5	40.0	39.5	29.0	44.5	42.5	38.7	45.5	28.5	.139	.189	.204	.175
29	29.285	29.314	29.374	29.324	36.5	44.5	38.5	38.5	47.5	40.0	42.0	47.5	36.5	.190	.268	.215	.224
30	29.372	29.266	29.339	29.326	30.5	30.5	28.0	32.5	32.5	30.0	31.7	40.0	30.0	.148	.148	.130	.142
31	29.624	29.635	29.762	29.680	20.5	35.0	16.5	21.5	37.5	18.0	25.7	38.5	18.0	.099	.171	.075	.115
Means...	29.506	29.420	29.454	29.460	28.5	35.9	31.2	30.1	39.6	33.2	34.2	....	....	.153	.178	.165	.165
1863.																	
Jan. 1	29.764	29.735	29.512	29.670	15	29	27.5	16	32.5	29	25.8	39.5	16	.074	.120	.133	.109
2	29.412	29.299	29.282	29.331	32.5	37.5	36	34.5	40.5	39	38.0	41.5	29	.158	.185	.173	.172
3	29.298	29.208	29.145	29.217	36.5	43	42	38.5	45	44	42.5	45	36	.190	.251	.241	.227
4	28.676	28.908	29.052	28.879	47.5	41	33	49.5	43	35.5	42.7	49.5	34	.303	.231	.156	.230
5	29.112	29.037	28.958	29.036	32	43.5	41	34	47.5	45	42.2	47.5	33	.149	.230	.205	.195
6	29.084	29.134	29.331	29.183	31.5	27.5	21	33	29.5	22.5	28.3	45	22.5	.165	.125	.096	.127
7	29.568	29.601	29.714	29.624	18	21.5	18.5	19.5	23	20	20.8	23	17	.081	.098	.083	.087
8	29.690	29.607	29.634	29.644	18.5	27.5	27	20	29.5	29	26.2	30.5	17.5	.083	.121	.124	.109
9	29.697	29.511	29.379	29.529	27.5	32	30.5	29.5	33.5	31.5	31.5	34	27	.121	.162	.158	.147
10	28.979	28.958	29.067	29.001	39	35.5	30.5	40.5	37.5	32.5	36.8	40.5	31.5	.219	.182	.147	.183
11	29.127	29.217	29.466	29.270	26	31	27	28	33.5	29	30.2	34	25	.117	.145	.124	.129
12	29.468	29.376	29.597	29.480	27	36.5	27.5	28.5	38.5	29	32.0	40	22	.130	.190	.133	.151
13	29.582	29.309	29.221	29.371	32.5	34.5	43	33.5	35.5	44.5	37.8	44.5	27.5	.171	.187	.258	.205
14	29.168	29.042	29.194	29.135	41.5	36.5	28	42	37.5	30	36.5	50	30	.256	.203	.130	.196
15	29.188	29.033	28.895	29.039	25	25.5	22.5	26.5	27.5	24	26.0	30	23	.118	.126	.103	.119
16	28.957	29.130	29.445	29.177	12.5	15	4.5	13.5	16.5	5.5	11.8	24	5.5	.064	.069	.042	.058
17	29.716	29.827	29.941	29.828	0	26.5	13.5	1	27.5	14.5	14.3	28.5	—7	.032	.132	.068	.077
18	29.998	29.933	29.897	29.943	10	29	21.5	12	31	23	22.0	32	9.5	.046	.137	.098	.094
19	29.814	29.776	29.733	29.774	9.5	30.5	29.5	10.5	32.5	31	24.7	32	9.5	.055	.147	.146	.116
20	29.513	29.399	29.369	29.427	31.5	32.5	32.5	32.5	33.5	33.5	33.2	33.5	29.5	.165	.171	.171	.169
21	29.470	29.528	29.612	29.537	32.5	35.5	31.5	33.5	36.5	33	34.3	36.5	33	.171	.195	.160	.175
22	29.599	29.478	29.492	29.523	31.5	34.5	33	32.5	35.5	34.5	34.2	35.5	32	.165	.187	.169	.174
23	29.539	29.483	29.469	29.497	32	34	33.5	33.5	36.5	34.5	34.8	37.5	33.5	.162	.170	.179	.170
24	29.426	29.385	29.524	29.445	37	48.5	37	38	50.5	38.5	42.3	53	33.5	.207	.315	.201	.241
25	29.684	29.607	29.620	29.637	26.5	45.5	32	28	47.5	34	36.5	51.5	27	.126	.278	.155	.186
26	29.466	29.271	29.245	29.327	34	41	34.5	35.3	42.5	36	38.0	43	32.5	.176	.238	.180	.198
27	29.256	29.243	29.374	29.291	28.5	31.5	28.5	29.5	33.5	30	31.0	36	29	.145	.154	.139	.146
28	29.426	29.379	29.310	29.372	25.5	32.5	18	26.5	35.5	19.5	27.2	36	19.5	.126	.145	.081	.117
29	29.160	29.016	29.037	29.071	15	33.5	30.5	16.5	35.5	32	28.0	40.5	15	.069	.166	.153	.129
30	29.120	29.226	29.462	29.269	26.5	33	30	27.5	35.5	31.5	31.5	35.5	27.5	.132	.156	.150	.146
31	29.454	29.310	29.357	29.374	24	36.5	29	25.5	40.5	31	32.3	43	25	.112	.164	.137	.138
Means...	29.400	29.353	29.397	29.387	26.6	33.6	28.8	27.9	35.6	30.5	31.3	....	....	.138	.173	.145	.152

of the north and northwestern lakes, at Monroe City, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.890	.719	.797	.802	W.NW.	W	NW	2	2	4	2.5	N. 61 W.	2	7	10	......	....
.812	.760	.782	.785	W	S	S	2	4	4	2.8	S. 14 W.	9	6	8	......	....
.878	.737	.786	.800	S. SW	W. SW	SW	2	12	4	5.8	S. 58 W.	5	10	10	......	....
.818	.632	.708	.719	SW	S	W	4	4	25	9.5	S. 77 W.	8	3	10	......	....
.821	.483	.655	.653	W	W. SW	SW	2	25	4	10.7	S. 67 W.	8	4	10	......	....
.623	.677	.706	.669	NW	NW	SW	25	25	2	16.7	N. 47 W.	1	8	0	......	0.01
.880	.685	.726	.764	W	W	W	4	12	2	6.0	West	0	9	0	......	....
.769	.674	.776	.740	S	SW	W	4	4	2	2.8	S. 35 W.	8	9	0	......	....
.804	.740	.775	.773	W	SW	SW	2	4	4	3.2	S. 54 W.	10	10	10	......	....
.797	.269	.591	.552	S	SW	SW	4	12	4	6.3	S. 37 W.	1	2	0	......	....
.669	.390	.732	.590	S. SW	W. SW	SW	25	25	4	16.7	S. 45 W.	0	0	10	......	....
.787	.489	.816	.697	SE	S	E	4	4	4	3.1	S. 45 E.	9	8	10	......	....
.863	.770	.864	.832	SE	S. SW	S	2	12	12	8.2	S. 8 W.	10	10	10	......	0.02
.899	.874	.904	.892	SW	SW	S	4	12	12	6.2	S. 18 W.	10	10	10	......	0.28
.859	.784	.847	.830	W. SW	W	W	12	4	4	6.5	S. 76 W.	10	10	10	......	0.88
.853	.717	.775	.782	SW	SW	SW	25	35	4	21.3	S. 45 W.	8	5	1	......	0.34
.810	.670	.784	.755	NW	NW	NW	12	25	2	9.7	N. 69 W.	8	5	0	......	....
.769	.653	.729	.717	S	S	S	4	25	25	18.0	South	4	4	4	......	....
.785	.654	.682	.674	NW	NW	NW	4	12	4	6.7	N. 45 W.	1	3	0	......	....
.784	.721	.769	.758	NW	E. SE	E. SE	4	12	4	4.2	S. 75 E.	5	5	1	......	....
.761	.761	.794	.772	S. SE	S	SE	4	4	4	3.8	S. 22 E.	10	10	10	......	0.01
.807	.688	.831	.775	S. SW	S. SW	S. SW	4	12	2	6.0	S. 23 W.	10	8	10	......	....
.899	.741	.792	.811	W. NW.	N. NE	NE	2	4	4	0.8	S. 88 E.	10	7	10	......	....
.899	.745	.925	.856	E	S	S. SW	4	2	12	4.3	S. 3 W.	7	3	3	......	0.12
.890	.736	.885	.837	SW	SW	SW	2	2	2	2.0	S. 45 W.	10	10	10	......	0.01
.911	.702	.840	.818	NE	SW	W. SW	4	12	35	14.3	S. 63 W.	10	6	6	......	1.01
.853	.863	.847	.854	W	S	N	2	2	4	1.0	N. 45 W.	10	7	5	......	0.03
.822	.641	.747	.737	SW	S	S	12	12	25	15.3	S. 11 W.	4	5	6	......	....
.814	.845	.865	.841	S. SW	NW	NW	2	2	2	1.2	N. 74 W.	3	8	5	......	....
.797	.797	.782	.792	NE	NE	N	25	35	25	26.7	N. 32 E.	10	10	6	......	0.15
.858	.762	.761	.794	W. NW.	W. NW	SW	4	2	2	2.3	N. 83 W.	3	1	0	......	0.30
.822	.689	.783	.764	....	....	....	....	....	....	4.2	N. 53 W.	6.6	6.5	5.9	......	3.16
.829	.649	.831	.770	S	S. SW	S	4	2	4	3.2	S. 5 W.	3	3	10	......	....
.794	.735	.726	.752	SE	SE	S	2	4	2	2.5	S. 34 E.	9	6	10	......	....
.813	.840	.836	.830	S. SE	SE	SE	2	2	2	1.9	S. 38 E.	10	10	8	......	.01
.854	.833	.750	.812	S	W. SW	W	35	60	4	27.5	S. 46 W.	10	10	3	......	.43
.744	.701	.684	.710	S. SW	SE	S	4	4	45	17.0	S. 2 E.	1	6	9	......	.06
.897	.729	.794	.807	W	W	W	4	25	45	24.7	West	9	10	10	......	.05
.772	.797	.776	.782	SW	W	SW	25	25	2	16.2	S. 66 W.	10	10	10	......	....
.776	.729	.775	.760	S	S	SW	2	4	2	2.5	S. 11 W.	9	10	10	......	....
.729	.841	.894	.821	S	SE	E	2	4	4	2.8	S. 55 E.	10	10	9	......	....
.866	.809	.797	.824	SE	SW	SW	25	25	25	18.8	S. 18 W.	10	8	5	......	.01
.768	.756	.775	.766	W	W	NW	4	25	4	10.7	N. 85 W.	7	9	10	......	.07
.829	.813	.831	.821	SE	E	E	4	12	2	5.8	S. 81 E.	9	5	0	......	....
.894	.899	.878	.890	NE	NE	W	25	25	25	12.2	N. 17 E.	10	9	10	......	.10
.956	.904	.782	.881	W	W	NW	2	2	35	12.7	N. 49 W.	10	10	10	......	.18
.818	.878	.803	.833	N	N. NE	W	2	12	2	4.5	N. 11 E.	10	10	10	......	.11
.813	.748	.755	.772	NW	W. NW	SE	25	25	4	15.2	N. 58 W.	10	5	0	......	.36
.707	.881	.819	.802	NW	SE	SE	2	2	2	0.7	S. 45 E.	10	3	0	......	.02
.610	.788	.797	.732	SE	SE	NE	12	4	25	10.0	N. 77 E.	0	0	0	......	....
.794	.797	.841	.811	NE	NE	E	2	12	12	8.0	N. 66 E.	3	10	10	......	....
.897	.894	.894	.895	NE	E	E. SE	25	35	4	22.5	N. 70 E.	10	10	10	......	.20
.894	.901	.850	.882	NE	E	S	2	4	4	2.0	S. 64 E.	10	10	10	......	.52
.897	.899	.845	.880	S	S	E	2	4	25	8.5	S. 76 E.	10	10	10	......	.01
.841	.802	.896	.846	SE	E	S. SW	4	25	25	10.5	S. 36 E.	10	10	10	......	.04
.905	.857	.860	.874	S	S. SW	SE	4	12	2	5.6	S. 11 W.	3	10	5	......	.02
.825	.848	.792	.822	S	E. SE	NW	4	2	2	1.2	S. 7 E.	0	2	5	......	....
.849	.873	.851	.858	E. SE	SW	NW	2	2	25	7.8	N. 49 W.	10	3	10	......	.02
.888	.807	.885	.860	W. NW.	NW	S	12	25	2	11.7	N. 54 W.	10	10	10	......	.51
.878	.701	.772	.784	S	S	NW	4	4	2	2.3	S. 12 W.	3	10	4	......	.07
.748	.799	.850	.799	NW	NW	W	4	4	25	10.3	N. 80 W.	10	7	9	......	....
.881	.750	.843	.815	SW	W	S	12	25	4	11.8	S. 69 W.	10	9	9	......	.01
.812	.649	.788	.750	S	S	S	4	35	4	14.3	South	1	3	0	......	.01
.819	.832	.815	.822	....	....	....	....	....	....	2.7	S. 53 W.	7.6	7.6	7.2	......	2.81

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	29.115	28.924	29.041	29.027	28.5	35.5	21.5	30	37.5	23.5	30.3	39	23.5	.139	.181	.092	.137
2	29.511	29.527	29.581	29.540	14.5	23.5	9	16	29.5	10	18.5	29	9	.067	068	.054	.063
3	29.696	29.753	29.925	29.791	0	14	3	1	16	4	7	17.5	0	.132	.059	.038	.043
4	30.027	29.960	29.868	29.952	2.5	15.5	15	3.5	18	17.5	13	18.5	—1	.037	.059	.037	.051
5	29.474	29.382	29.315	29.390	20	24	27	21	26.5	28.5	25.3	28.5	16	.096	.100	.130	.109
6	29.382	29.401	29.548	29.444	19	23.5	21	20	25.5	23	22.8	28	18.5	.092	.102	.090	.095
7	29.590	29.543	29.622	29.585	14	34	25.5	15	38	28	27	41.5	14	.071	.144	.109	.108
8	29.771	29.710	29.724	29.735	18	31.5	29	19.5	33.5	31	28	34.5	18	.081	.154	.137	.124
9	29.575	29.255	29.306	29.379	31.5	38.5	38.5	32.5	40.5	41.5	38.2	43	30	.165	.207	.194	.189
10	29.670	29.738	29.770	29.726	28	30.5	24.5	29.5	33.5	26.5	29.8	41.5	26.5	.136	.135	.109	.127
11	29.600	29.509	29.375	29.495	26.5	30	30.5	28	32.5	32	30.8	34	22	.126	.138	.153	.139
12	29.290	29.355	29.514	29.356	28	36	24.5	29	39.5	26.5	31.7	39.5	26.5	.142	.166	.109	.139
13	29.738	29.721	29.770	29.743	21.5	27.5	24.5	21.5	30	26	25.8	30.5	21	.115	.121	.115	.117
14	29.502	29.243	29.186	29.310	22.5	35	42.5	24	38.5	45	35.8	45	23	.103	.158	.239	.167
15	29.457	29.582	29.642	29.560	25	31.5	24.5	27	38	27	30.7	45.5	26.5	.112	102	.109	.108
16	29.850	29.872	29.750	29.824	16	31	25	17.5	33	27	25.8	40	16	.073	.151	.112	.112
17	29.637	29.523	29.577	29.579	23	34.5	27	25	37.5	29	30.5	39	24	.100	.161	.124	.128
18	29.404	29.337	29.232	29.258	28.5	32	32.5	30	34.5	34	32.8	37.5	24.5	.139	.149	.165	.151
19	29.102	28.902	28.865	28.956	33	41.5	37.5	35	43.5	39	39.2	43.5	34	.162	.236	.205	.201
20	29.205	29.361	29.581	29.382	32.5	38	28	34	42	30.5	35.5	44.5	30	.165	.177	.125	.156
21	29.862	29.875	29.735	29.824	16.5	21	18.5	18	25	20.5	21.2	31	17	.075	.067	.078	.073
22	29.451	29.449	29.664	29.521	15	23	16	16	25.5	17	19.5	25.5	15	.074	.095	.078	.082
23	29.804	29.681	29.681	29.722	5.5	26.5	18.5	6.5	28	19.5	17.7	28.5	4	.044	.126	.089	.086
24	29.593	29.572	29.565	29.577	16.5	38	22.5	18.5	46	24.5	29.7	46.5	16.5	.069	.125	.097	.097
25	29.578	29.511	29.423	29.504	18	38.5	32.5	19	42.5	34.5	32	43.5	14	.087	.181	.158	.142
26	29.118	28.944	29.141	29.084	35	50.5	37	37	54	40	43.7	54	34	.178	.321	.187	.227
27	29.286	29.441	29.594	29.440	30	41.5	31.5	36	47.5	33.5	39	48	33.5	.098	.184	.154	.145
28	29.639	29.448	29.249	29.445	24	31.5	32	25.5	38.5	34	32.7	38.5	24	.118	.148	.155	.140
Means....	29.533	29.484	29.508	29.508	21.1	30.7	25.6	22.7	34.8	27.6	28.4	....	....	.103	.139	.123	.122
March 1	29.057	29.184	29.316	29.186	30.5	37.5	34.5	32.5	41.5	37	37	43	31.5	.147	.172	.174	.164
2	29.264	29.247	29.206	29.239	28	33	32.5	30	36.5	34.5	33.7	40	29	.130	.143	.169	.147
3	29.284	29.414	29.546	29.415	26.5	28.5	21	28.5	30.5	23.5	27.5	34.5	23	.120	.133	.084	.112
4	29.708	29.753	29.785	29.749	13.5	28.5	18.5	14.5	32.5	20.5	22.5	34	13.5	.069	.111	.078	.086
5	29.760	29.483	29.262	29.502	16.5	30	30	18	34.5	33.5	28.7	34.5	14	.075	.115	.127	.106
6	29.199	29.274	29.395	29.289	37.5	41.5	33.5	40	48.5	35.5	41.3	51	33	.192	.171	.166	.176
7	29.351	29.292	29.299	29 314	25.5	31.5	26	27	37.5	29	31.2	38	26.5	.121	.108	.106	.112
8	29.154	29.123	29.132	29.136	25	37	31.5	26.5	40.5	34	33.7	40.5	25.5	.118	.185	.148	.150
9	29.385	29.434	29.537	29.452	17.5	32.5	21.5	19.5	34.5	23.5	25.8	38	19	.073	.158	.092	.108
10	29.517	29.323	29.245	29.362	18	41	27	19.5	45.5	28.5	31.2	46.5	18.5	.081	.198	.130	.136
11	29.226	29.297	29.390	29.314	22	33.5	23.5	25	38.5	25.5	29.7	40.5	23	.084	.126	.103	.104
12	29.547	29.571	29.433	29.517	16.5	27.5	17	18	31	19	22.7	31.5	18	.075	.110	.071	.085
13	29.611	29.532	29.598	29.587	7	27.5	19.5	8	32	21.5	20.5	34	6	.048	.098	082	.076
14	29.441	29.308	29.284	29.344	18.5	32.5	25.5	20.5	36.5	27.5	28.2	38.5	19	.078	.132	.115	.108
15	29.229	29.181	29.239	29.216	24.5	27.5	26.5	26.5	31.5	28.5	28.8	32.5	25.5	.109	.104	.120	.111
16	29.494	29.543	29.520	29.519	21	39.5	32	23.5	49.5	34.5	35.8	51.5	23	.084	.111	.149	.115
17	29.366	29.291	29.269	29.309	29	52	40.5	31	61	41	44.3	64.5	30.5	.137	.269	.245	.217
18	29.597	29.690	29.774	29.687	30	32	25	31.5	41.5	27.5	33.5	43.5	27.5	.150	.058	.106	.105
19	29.810	29.755	29.767	29.777	25	27	28	27	32.5	30	29.8	34	23.5	.112	.084	.130	.108
20	29.675	29.591	29.560	29.609	28.5	27.5	29	31	32.5	32.5	32	33	29	.128	.093	.120	.114
21	29.430	29.423	29.480	29.444	33.5	44	37.5	34.5	47.5	40	42	47.5	32	.179	.242	.198	.206
22	29.510	29.434	29.365	29.436	35	39	36	36.5	41	38	38.5	41	34.5	.184	.212	.186	.194
23	29.297	29.233	29.201	29.244	35.5	36.5	37	36.5	40.5	38	38.3	40.5	36	.195	.164	.207	.189
24	28.922	28.940	29.134	28.999	44	41.5	38	45	44.5	40	43.2	50	37	.275	.223	.203	.234
25	29.078	29.071	29.140	29.096	33.5	37	32	34.5	38.5	33.5	35.5	39.5	33.5	.179	.201	.162	.181
26	29.282	29.324	29.467	29.358	26.5	28.5	29	28	34.5	31.5	31.3	37.5	27	.196	.093	.131	.140
27	29.529	29.441	29.326	29.432	21.5	30	31.5	23	40.5	33.5	32.3	42	22	.098	.046	.154	.099
28	29.116	29.052	29.275	29.148	31	43.5	25.5	32.5	50.5	28.5	37.2	53	28.5	.157	.191	.103	.150
29	29.483	29.526	29.684	29.564	18	32	28	20	37.5	30.5	29.3	41.5	18.5	.076	.110	.125	.137
30	29.734	29.596	29.402	29.584	19	37.5	30.5	20.5	43	33	32.2	45	19	.086	.153	.141	.127
31	29.128	29.081	29.333	29.181	30	34	22.5	32.5	37.5	25	30	40.5	25	.138	.150	.091	.126
Means...	29.393	29.369	29.399	29.387	25.4	34.5	28.7	27.1	39.4	30.2	32.2	....	....	.125	.137	.136	.133

of the north and northwestern lakes, at Monroe City, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1. 000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.885	.809	.734	.809	S.SE	S	W	4	4	45	4.7	S. 80 W	10	10	3	......	....
.741	.441	.791	.658	W	W	W.NW	25	25	25	24.8	N. 83 W	7	5	6	......	....
.709	.659	.740	.702	W	W	W	4	12	2	6.0	West	0	5	0	......	....
.725	.603	.597	.645	NE	NE	NE	35	12	25	24.0	N. 45 E	5	7	5	......	....
.855	.699	.829	.798	NE	NE	NE	35	4	2	13.7	N. 45 E	10	10	10	......	.08
.850	.750	.730	.777	SW	W	W	12	12	2	8.0	S. 69 W	9	10	0	......	.47
.823	.628	.711	.721	S	S	S	4	12	2	6.0	South	2	4	9	......	....
.772	.807	.788	.789	N	NE	NE	2	2	4	2.5	N. 34 E	10	10	10	......	....
.897	.822	.741	.820	E	SE	SW	12	4	25	7.0	S. 8 W	10	10	10	......	.36
.834	.707	.757	.766	W	SW	SW	25	12	2	12.0	S. 74 W	10	8	7	......	.02
.826	.748	.845	.806	SE	SE	SE	12	4	2	6.0	S. 45 E	10	10	10	......	....
.887	.685	.711	.761	NE	N	N	4	4	4	3.7	N. 14 E	10	8	10	......	.68
1.000	.729	.815	.848	N	NE	NE	2	12	4	5.8	N. 40 E	10	9	10	......	.06
.803	.677	.800	.760	SE	E	S.SW	12	25	35	15.3	S. 27 E	0	6	7	......	....
.761	.444	.757	.654	W	W	W	25	35	4	21.3	West	5	0	0	......	.07
.575	.800	.761	.712	W.NW	SE	N.NE	2	4	4	1.0	N. 55 E	2	3	10	......	....
.746	.715	.775	.745	E	E	E	2	4	2	2.7	East	1	1	0	......	....
.885	.744	.843	.824	E.NE	E	E	2	4	2	2.6	N. 84 E	10	10	10	......	....
.797	.834	.861	.831	N	N	NE	2	2	2	1.9	N. 15 E	10	10	10	......	.01
.843	.661	.733	.746	W.NW	W.NW	NW	12	25	25	20.2	N. 58 W	10	4	0	......	.04
.561	.500	.707	.589	N.NW	N.NE	N.NE	4	12	45	20.0	N. 20 E	10	10	10	......	....
.829	.689	.834	.784	N.NE	N	N	35	35	4	24.3	N. 11 E	10	8	0	......	.10
.764	.826	.847	.812	NW	E	E	4	4	2	1.4	N. 49 E	10	7	6	......	.04
.687	.400	.742	.610	SW	W	W	2	2	2	1.9	S. 75 W	10	2	0	......	....
.845	.665	.794	.768	E	E	E	2	12	4	6.0	East	5	5	9	......	....
.807	.769	.732	.769	SE	S.SW	W	2	12	35	13.5	S. 72 W	10	10	10	......	.05
.462	.558	.807	.609	W	W	W	35	25	2	20.7	West	10	5	0	......	....
.818	.632	.792	.747	N	NE	E	20	4	12	5.2	N. 72 E	9	8	4	......	....
.785	.678	.770	.744	....	....	....	....	....	....	3.0	N. 50 W	7.6	6.9	5.9	......	1.98
.798	.659	.804	.754	W	W	W	4	4	4	4.0	West	10	10	10	......	.15
.782	.661	.845	.763	SE	SE	W	2	4	2	1.6	S. 28 E	7	10	0	......	.01
.771	.785	.669	.742	W.NW	W.NW	W.NW	12	25	2	13.0	N. 67 W	10	10	9	......	.15
.819	.600	.707	.709	NW	W	W	2	4	2	2.5	N. 79 W	1	3	2	......	....
.761	.577	.659	.666	S	S	S	4	12	35	17.0	South	8	10	10	......	....
.776	.499	.799	.691	W	W	W	35	12	2	16.3	West	10	4	5	......	....
.821	.483	.665	.656	E	NE	NE	45	25	4	22.8	N. 73 E	10	4	10	......	.14
.818	.735	.760	.771	W.NW	S.SW	S	2	4	12	5.0	S. 13 W	10	10	10	......	.21
.694	.794	.734	.742	SW	SW	SW	25	35	2	20.3	S. 46 W	0	2	0	......	....
.772	.650	.829	.750	S.SW	S	S	2	4	2	2.6	S. 6 W	0	5	1	......	....
.622	.542	.750	.638	SW	SW	W	4	12	4	6.7	S. 47 W	5	7	3	......	....
.761	.633	.692	.795	W.NW	W.NW	SW	4	25	12	12.0	S. 86 W	7	8	1	......	.16
.777	.545	.716	.679	SW	NW	W	4	4	2	2.5	West	7	5	0	......	....
.707	.614	.764	.695	W	NE	NE	2	4	25	9.2	N. 42 E	10	10	3	......	....
.757	.590	.771	.706	NE	E	E	35	12	4	15.7	N. 58 E	3	8	10	......	....
.669	.315	.744	.576	NW	W	S	2	4	2	1.8	S. 83 W	0	1	9	......	....
.788	.502	.955	.748	S	SW	SW	4	4	2	3.1	S. 27 W	5	5	10	......	....
.843	.220	.707	.590	N	N.NE	NE	4	12	4	6.3	N. 23 E	9	1	7	......	.21
.765	.455	.782	.666	E	E	E.NE	25	25	45	31.0	N. 79 E	5	5	10	......	....
.737	.503	.649	.630	E.NE	E.NE	E.NE	60	60	75	65.0	N. 67 E	10	8	10	......	.04
.896	.737	.818	.817	E.SE	SE	E	2	2	2	1.9	S. 67 E	10	8	10	......	.12
.853	.824	.811	.829	N.NE	E	E	2	12	25	12.5	N. 87 E	10	10	10	......	.84
.901	.649	.905	.818	E	E	E	12	12	4	9.3	East	10	10	10	......	.72
.920	.759	.820	.833	E	W	N	4	12	2	2.7	N. 76 W	10	9	7	......	.26
.896	.860	.841	.866	SW	SW	W.NW	2	4	12	5.1	N. 1 W	10	10	9	......	.12
.858	.477	.746	.694	W.NW	W.NW	W	4	4	2	3.2	N. 72 W	9	6	7	......	....
.797	.184	.807	.596	E	NE	E	2	4	4	3.1	N. 72 E	0	3	1	......	....
.848	.520	.660	.676	E	NW	W.NW	2	12	45	18.3	N. 62 W	3	6	8	......	....
.702	.488	.733	.641	W.NW	W.NW	W.NW	35	12	4	17.0	N. 67 W	10	4	0	......	....
.780	.550	.752	.694	W	E.NE	E.NE	2	4	4	2.1	N. 61 E	2	3	1	......	....
.748	.669	.684	.700	S	W.NW	NW	2	25	12	11.8	N. 63 W	9	10	5	......	....
.756	.551	.728	.678	....	....	....	....	....	....	1.8	N. 42 E	6.8	6.6	6.2	......	3.13

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	29.463	29.162	28.981	29.202	9	33.5	36.5	10	38.5	39.5	29.3	45.5	9	.054	.146	.177	.126
2	28.703	28.871	29.082	28.885	44.5	45.5	32	48	53.5	35	45.5	54.5	35.5	.247	.199	.142	.196
3	29.255	29.534	29.700	29.496	32.5	37.5	29.5	35.5	45.5	31.5	37.5	48.5	30.5	.145	.120	.140	.135
4	29.798	29.694	29.574	29.789	21	39.5	24.5	23	45	29.5	32.5	47.5	19.5	.090	.184	.075	.116
5	29.474	29.335	29.246	29.352	21.5	45.5	45.5	23	56.5	48.5	42.7	59.5	23	.098	.161	.265	.175
6	29.228	29.314	29.450	29.331	36.5	35.5	39.5	40.5	41.5	32.5	38.2	48.5	20.5	.164	.130	.129	.141
7	29.547	29.382	29.662	29.530	28	30.5	29	30	35.5	32	32.5	36	25.5	.130	.112	.126	.123
8	29.716	29.576	29.704	29.665	25.5	34	26	27.5	38	28.5	31.3	41.5	26	.115	.144	.112	.124
9	29.743	29.685	29.550	29.693	23	35.5	35	24.5	42.5	37	34.7	45.5	20	.106	.117	.178	.100
10	29.381	29.262	29.108	29.250	37.5	53.5	51.5	41.5	63.5	55.5	53.5	65	35	.172	.277	.327	.259
11	29.186	29.096	29.145	29.142	52.5	63.5	53.5	58.5	76	57.5	64.	76	53.5	.316	.419	.357	.364
12	29.412	29.471	29.547	29.477	37.5	42.5	33	40	47	35.5	40.8	57.5	35.5	.192	.213	.156	.187
13	29.593	29.471	29.586	29.550	26	43	31	28.5	48.5	33.5	36.8	50.5	24.5	.112	.205	.145	.154
14	29.521	29.408	29.357	29.429	35	46.5	42	38	53.5	46.5	46.	53.5	28	.165	.224	.208	.199
15	29.325	29.278	29.326	29.310	40	43.5	46	44.5	51.5	47.5	47.8	53	41	.189	.178	.291	.219
16	29.390	29.383	29.405	29.393	42	47.5	42.5	44.5	51.5	44.5	46.8	53	43	.234	.276	.246	.252
17	29.425	29.364	29.365	29.385	41	50.5	45	44.5	56.5	47.5	49.5	58.5	42	.211	.288	.266	.222
18	29.395	29.330	29.315	29.347	46	47.5	42.5	49	54.5	45	49.8	58	36	.271	.237	.239	.249
19	29.274	29.318	29.395	29.329	44.5	46.5	48	47.5	52.5	50	50.	54	44	.278	.237	.309	.275
20	29.485	29.442	29.561	29.496	47	58	48.5	49.5	69.5	51	56.7	71	47.5	.290	.370	.308	.309
21	29.595	29.511	29.503	29.540	44	47.5	47	45.5	52	50	52.5	52	45	.268	.270	.283	.273
22	29.425	29.381	29.341	29.382	44.5	40.5	45.5	46	45.5	47	46.2	50	44	.273	.187	.285	.215
23	29.290	29.273	29.293	29.285	44	48.5	47.5	45	51.5	49	48.5	53	43	.275	.302	.309	.295
24	29.271	29.233	29.331	29.278	41.5	57.5	50	43	70	54	59.	74	40.5	.243	.307	.308	.286
25	29.507	29.501	29.524	29.511	37.5	46.5	40	41	58.5	45	48.2	65.5	35	.192	.159	.182	.178
26	29.613	29.591	29.574	29.593	41.5	47	42.5	47.5	57.5	45	50.	60	29	.236	.185	.239	.220
27	29.535	....	29.339	29.437	33.5	....	47	36	....	53	49.5	65	35	.160	....	.244	.202
28	29.246	29.196	29.200	29.214	45.5	51.5	45	50.5	61.5	53	55.	63	45	.239	.248	.225	.236
29	29.200	29.214	29.276	29.230	44	55	47.5	59	65	52	55.3	67	44	.223	.300	.270	.264
30	29.368	29.385	29.378	29.377	42	60	47	47.5	71.5	51.5	56.8	72	37	.195	.365	.264	.275
Means....	412	29.367	29.397	29.392	36.9	45.8	41.0	40.0	53.6	43.6	45.7	....	....	.196	.217	.227	.213
May 1	29.422	29.321	29.272	29.338	39	55	52	41.5	70	58	56.5	71	35	.206	.234	.309	.250
2	29.312	29.328	29.335	29.325	44.5	62	46	48.5	75	52	58.5	75	45.5	.241	.382	.232	.285
3	29.350	29.329	29.295	29.325	42.5	50.5	45	46	56.5	45	50.5	60	42.5	.226	.288	.240	.251
4	29.220	29.256	29.218	29.298	48	49.5	45	52	54.5	48.5	51.7	58	47.5	.282	.288	.253	.275
5	29.141	29.139	29.227	29.169	42	41	38	44	42.5	40	42.2	49	39	.241	.238	.203	.294
6	29.266	29.315	29.372	29.318	40	42.5	40.5	41.5	44.5	42.5	42.8	44.5	38.5	.228	.246	.225	.233
7	29.376	29.297	29.345	29.339	39	45.5	42	41.5	54.5	45	47.	51.5	40	.206	.186	.228	.207
8	29.414	29.380	29.363	29.386	37.5	57.5	50.5	40	70	56	55.3	73	33.5	.192	.307	.294	.264
9	29.406	29.330	29.350	29.362	50	60	57	56	72	63	63.7	75	40.5	.282	.358	.386	.342
10	29.401	29.325	29.291	29.339	55	65.5	58.5	62.5	81.5	66	70.	81.5	54	.334	.414	.397	.382
11	29.406	29.352	29.405	29.388	60.5	66.5	63	70.5	84	68	74.2	87	63.5	.394	.416	.509	.440
12	29.441	29.468	29.501	29.470	60.5	57.	54.5	66	64	57	62.3	73	57	.454	.373	.392	.410
13	29.481	29.325	29.335	29.380	47	60	56	49.5	75	59.5	61.3	75	43.5	.200	.318	.403	.337
14	29.355	29.422	29.506	29.428	47	51.5	47.5	50.5	62	54	55.5	64	50	.277	.269	.243	.263
15	29.509	29.391	29.271	29.390	44	56.5	50.5	48.5	69	58	58.5	70	40	.221	.291	.268	.263
16	29.119	29.131	29.263	29.171	52	57.5	48	60	73.5	53.5	62.3	73.5	54	.282	.261	.263	.269
17	29.323	29.348	29.394	29.355	41	50.5	48	45	62.5	53.5	53.7	65	37.5	.205	.209	.263	.226
18	29.602	29.505	29.522	29.543	42.5	56.5	49	45.5	68.0	56	56.5	70	43	.233	.304	.255	.264
19	29.597	29.498	29.493	29.529	42.5	60.5	55	47	78	65.5	63.5	80	39	.213	.294	.294	.267
20	29.500	29.510	29.520	29.510	51	64	55.5	58	86	68	70.7	87	56.5	.282	.302	.275	.286
21	29.648	29.616	29.607	29.624	49	68.5	59	54	86	65	68.3	87	51	.282	.462	.420	.388
22	29.695	29.597	29.551	29.608	52.5	67.5	59.5	56.5	87.5	65	69.7	89	52.5	.342	.403	.435	.393
23	29.480	29.359	29.388	29.409	55	67.5	62.5	59	84.5	68	70.5	84.5	56	.380	.445	.492	.439
24	29.403	29.308	29.261	29.314	53	63	63	57	81.5	67.5	68.7	82	49	.350	.328	.516	.398
25	29.266	29.245	29.286	29.266	54	71	59	58	86	65	69.7	86.5	56	.365	.556	.420	.447
26	29.358	29.380	29.466	29.401	57	64	59	60	69	64	64.3	72.5	59	.426	.529	.433	.463
27	29.485	29.470	29.470	29.475	59	64	58	63	74.5	66	67.8	74	58	.447	.456	.376	.426
28	29.510	29.454	29.386	29.450	57	67.5	58	61	79	62.5	67.5	79	57	.412	.518	.423	.451
29	29.350	29.240	29.082	29.224	59	68.5	61.5	62.5	79.5	68	70.	80	58	.453	.549	.459	.487
30	28.893	28.820	28.895	28.869	64	65.5	62.5	65.5	69.5	65.5	66.8	70	65	.576	.597	.526	.566
31	28.845	28.830	28.873	28.849	61.5	68	58	63.5	73.5	59.5	65.5	76	59	.519	.611	.463	.531
Means....	29.371	29.331	29.340	29.347	49.9	59.5	53.3	55.4	71.4	59.0	61.9	....	....	.317	.369	.358	.348

of the north and northwestern lakes, at Monroe City, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1. 000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.791	.665	.729	.728	W	S. SW	S. SW	4	25	25	17. 2	S. 27 W.	1	4	1	......	.13
.740	.488	.698	.642	SW	SW	SW	60	35	4	33. 0	S. 45 W.	10	6	2	......	.01
.701	.393	.791	.628	N. NW	N	W	25	4	2	9. 8	N. 23 W.	10	3	0	......	....
.730	.636	.452	.606	NW	E	E	2	4	4	2. 2	N. 78 E.	0	0	0	......	....
.797	.352	.779	.643	SW	S	SW	2	4	2	2. 4	S. 23 W.	1	2	8	......	....
.649	.494	.695	.613	W	NW	NW	12	4	25	12. 7	S. 58 W.	10	8	10	......	....
.782	.543	.694	.675	NW	NW	N	25	4	2	10. 0	N. 42 W.	3	8	3	......	.02
.764	.628	.716	.703	NW	SE	S	4	2	2	0. 5	S. 68 W.	10	7	1	......	....
.807	.426	.807	.680	SW	NE	E	2	4	4	1. 8	N. 75 E.	0	1	0	......	....
.657	.474	.745	.625	SE	S	E	2	12	2	4. 6	S. 14 E.	0	10	10	......	....
.644	.467	.754	.622	S. SW	S	S. SW	2	45	2	16. 0	S. 2 W.	6	5	3	......	....
.776	.660	.750	.729	NW	N. NW	N	4	4	2	3. 2	N. 27 W.	10	5	0	......	.37
.716	.602	.756	.691	E	E	Calm	2	4	0	2. 0	East	3	0	0	......	....
.719	.548	.657	.641	N. NE	E. NE	NE	12	4	4	6. 6	N. 63 E.	5	6	10	......	....
.641	.466	.886	.664	E	NE	NE	12	12	2	8. 0	N. 66 E.	7	8	10	......	....
.798	.724	.838	.787	N	NW	SE	12	4	2	1. 2	N. 23 W.	10	7	10	......	.26
.720	.630	.811	.720	N. NW	E. NE	S	2	2	2	0. 4	N. 59 E.	1	5	0	......	....
.781	.556	.800	.712	E. SE	NE	E. NE	45	35	25	17. 0	N. 60 E.	0	2	0	......	....
.848	.602	.856	.769	E	E. SE	SW	35	2	2	12. 0	S. 86 E.	1	5	0	......	.23
.819	.457	.824	.700	W	S. SW	NE	4	2	2	1. 2	S. 83 W.	1	4	1	......	....
.881	.692	.786	.786	E. NE	NE	NE	45	45	60	49. 2	N. 52 E.	10	8	10	......	.24
.882	.612	.884	.793	NE	E. NE	NE	12	25	4	13. 3	N. 59 E.	10	10	10	......	.84
.920	.792	.889	.867	NE	NW	SE	4	2	2	1. 3	N. 45 E.	10	8	3	......	.02
.874	.420	.738	.677	W. NW	NW	NE	2	2	12	4. 0	N. 27 E.	0	0	0	......	....
.776	.324	.607	.569	NW	NW	N	25	4	2	10. 0	N. 42 W.	0	0	0	......	....
.834	.390	.800	.675	E. NE	E	Calm	4	2	0	1. 9	N. 75 E.	1	1	2	......	....
.753	......	.606	.680	N	......	NE	2	....	2	1. 2	N. 23 E.	3	....	3	......	....
.649	.456	.590	.565	E	NE	NE	4	12	2	5. 7	N. 55 E.	10	6	9	......	....
.638	.487	.692	.606	N	S	S	2	2	2	0. 7	South	9	4	6	......	....
.594	.473	.689	.585	N	SE	E	12	4	2	3. 5	N. 28 E.	0	0	0	......	....
......	......	......	......	......	......	......	....	....	....	1. 9	N. 50 E.	4. 7	4. 6	3. 7	......	2. 12
.784	.320	.641	.582	W	E	E	2	2	2	0. 7	East	0	0	2	.213	....
.707	.441	.598	.582	W	NE	NE	2	12	4	4. 9	N. 39 E.	7	3	3	.203	....
.729	.630	.676	.678	NE	E	E	4	25	25	17. 7	N. 87 E.	9	9	5	.088	....
.727	.677	.743	.716	NE	E. NE	E. NE	2	25	25	17. 3	N. 67 E.	4	10	10	.078	....
.836	.873	.820	.843	NE	NE	NE	25	35	12	24. 0	N. 45 E.	10	10	10	.015	.21
.869	.838	.831	.846	NE	NE	NE	12	4	25	13. 7	N. 45 E.	10	10	10	.028	.36
.784	.439	.762	.662	W	N	W	12	12	2	8. 0	N. 5 W.	3	7	0	.126	.01
.776	.420	.657	.618	SW	SE	Calm	2	4	0	1. 5	S. 18 E.	0	1	0	.215	....
.627	.457	.670	.551	W	SW	SW	4	2	2	2. 4	S. 67 W.	5	7	10	.183	....
.590	.385	.633	.536	S	SW	SW	4	12	2	5. 7	S. 35 W.	10	8	4	.336	....
.528	.357	.743	.543	S. SW	S	E	12	25	2	12. 3	S. 4 W.	5	3	2	.305	....
.710	.625	.841	.725	W	W	SW	25	12	4	13. 3	S. 86 W.	5	7	8	.087	....
.819	.365	.791	.658	W. SW	E	W	2	2	4	1. 3	S. 78 W.	0	6	10	.145	.02
.753	.537	.583	.624	NW	NW	NW	25	4	4	11. 0	N. 45 W.	8	7	4	.136	.29
.670	.411	.557	.546	W. NW	W. NW	SE	4	4	4	1. 5	N. 87 W.	0	5	7	.227	....
.546	.317	.640	.501	W. SW	W. NW	W. NW	35	35	12	25. 5	N. 87 W.	3	3	0	.305	....
.684	.369	.640	.564	W. SW	W. SW	W. NW	4	12	4	6. 3	S. 76 W.	0	5	9	.222	....
.764	.445	.569	.593	W. SW	W	W	12	12	4	7. 2	S. 80 W.	0	4	0	.199	....
.660	.307	.468	.478	SW	S. SW	SW	2	12	4	5. 9	S. 30 W.	0	0	2	.328	....
.584	.242	.402	.409	W. SW	W. SW	W. SW	12	12	2	8. 7	S. 67 W.	1	0	0	.362	....
.674	.371	.680	.575	W. SW	E	S	2	4	2	1. 2	S. 38 E.	0	0	0	.254	....
.749	.311	.705	.588	E. SE	SE	E	2	4	2	2. 5	S. 61 E.	0	0	0	.253	....
.765	.375	.719	.618	E	E	W	2	12	4	3. 3	East	0	5	1	.226	....
.752	.306	.766	.608	S. SW	S	W	4	2	2	2. 2	S. 32 W.	0	4	5	.221	....
.756	.448	.680	.628	W. SW	E	E	4	4	12	4. 1	S. 83 E.	0	3	3	.223	....
.822	.747	.727	.765	E	E	E. NE	25	4	12	13. 7	N. 84 E.	9	5	10	.145	.09
.776	.534	.588	.633	E. NE	E. NE	NE	25	25	25	24. 3	N. 60 E.	6	3	7	.248	.01
.769	.524	.748	.680	NE	E	SE	4	12	4	5. 9	East	4	3	3	.235	....
.802	.545	.671	.673	E	E. NE	NE	2	25	12	12. 7	N. 61 E.	9	5	5	.156	....
.917	.800	.837	.851	E. EN	S. SW	SW	12	45	2	13. 0	S. 11 W.	10	9	2	.139	.41
.887	.740	.909	.845	S	W	W	4	4	4	3. 0	S. 63 W.	10	7	0	......	.15
.736	.489	.687	.637	......	......	......	....	....	....	1. 4	N. 56 E.	4. 1	4. 8	4. 2	......	1. 55

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	28.940	28.952	29.008	28.967	54	53.5	51	57.5	62.5	56	58.7	62.5	54.5	.371	.292	.308	.324
2	29.214	29.172	29.266	29.217	49	58.5	54	52.5	70	59	60.5	70.5	47.5	.302	.339	.351	.331
3	29.367	29.363	29.344	29.391	44	60.5	49.5	48	70	54	57.3	71.5	44	.236	.400	.295	.310
4	29.387	29.320	29.314	29.340	44.5	57.5	56	47.5	71.5	62.5	60.5	74	40.5	.254	.289	.363	.302
5	29.342	29.285	29.483	29.370	50	62.5	46.5	59	70.5	52.5	60.7	74.5	51.5	.242	.459	.238	.313
6	29.566	29.612	29.642	29.607	44.5	57.5	44	46.5	62.5	50.5	56.5	66.5	42.5	.268	.408	.203	.293
7	29.687	29.601	29.630	29.639	45.5	55.5	51	48.5	66.5	53.5	56.2	70	38	.266	.295	.341	.267
8	29.626	29.541	29.510	29.559	43	61.5	53	46.5	75.5	59.5	60.5	75.5	38	.232	.359	.317	.303
9	29.526	29.424	29.395	29.448	52.5	67	54	57.5	82.5	64.5	68.2	86.5	44.5	.329	.454	.279	.354
10	29.387	29.340	29.260	29.329	59.5	65.5	62	63.5	84.5	69	72.3	85.5	48	.456	.374	.462	.431
11	29.227	29.242	29.300	29.256	58.5	63	57.5	63.5	69.5	64.5	65.8	73.5	66.5	.425	.489	.382	.432
12	29.390	29.360	29.432	29.394	55.5	72.5	61.5	57.5	86.5	69	71	87.5	48.5	.415	.603	.445	.488
13	29.498	29.519	29.524	29.514	61	69	61	64	86	66.5	72.2	89	55	.497	.480	.463	.480
14	29.548	29.468	29.434	29.483	58.5	74.5	67	63	92.5	72	75.8	94	55	.432	.610	.595	.546
15	29.441	29.342	29.432	29.405	63.5	77.5	59.5	70	95.5	71.5	79	97	65.5	.324	.698	.349	.457
16	29.547	29.457	29.391	29.465	57	65.5	62.5	64	78.5	68.5	70.3	79.5	64	.373	.454	.486	.438
17	29.209	29.123	29.181	29.171	69.5	75.5	66	75.5	94.5	78.5	82.8	95.5	62.5	.640	.626	.472	.579
18	29.167	29.060	29.087	29.105	60	67.5	61.5	67	84.5	70	73.8	85.5	55.5	.425	.446	.432	.434
19	29.135	29.117	29.185	29.146	56.5	61.5	57.5	60.5	81.5	64	68.7	82.5	58	.404	.345	.388	.379
20	29.151	29.196	29.253	29.200	55.5	56.5	54.5	57.5	62.5	16	62	67	55	.415	.378	.273	.355
21	29.221	29.234	29.338	29.264	53.5	57.5	54	56	63.5	57	58.8	64.5	53.5	.377	.395	.378	.383
22	29.276	29.234	29.386	29.299	53.5	61.5	54.5	55.5	68.5	65.5	61.5	70.5	51.5	.369	.452	.346	.389
23	29.474	29.455	29.500	29.476	50.5	60.5	58	53.5	70.5	64	62.7	73	48.5	.328	.394	.403	.375
24	29.555	29.544	29.530	29.540	55.5	64.5	56.5	59.5	79.5	68.5	69.3	80.5	46.5	.388	.407	.298	.364
25	29.427	29.453	29.467	29.449	59.5	66.5	59.5	63.5	79.5	67.5	70.2	81	55.5	.456	.476	.349	.427
26	29.467	29.423	29.442	29.444	58	71.5	67.5	62	83.5	71.5	72.3	86.5	55.5	.429	.610	.620	.553
27	29.442	29.499	29.352	29.431	65.5	72.5	66	69.5	81.5	70	73.5	81.5	58.5	.575	.677	.586	.613
28	29.373	29.275	25.248	29.299	67.5	72.5	68.5	71.5	84.5	73	76.3	86.5	63	.620	.637	.636	.631
29	29.200	29.169	29.166	29.178	68	72.5	66.5	74	79.5	71.5	74.7	84.5	62.5	.604	.569	.583	.585
30	29.204	29.216	29.282	29.234	69	75	68	76.5	86	73	78.5	89	68	.608	.719	.618	.648
Means....	29.366	29.333	29.359	29.353	56.1	65.3	58.4	60.4	77.5	64.9	67.6	....	....	.401	.471	.409	.427

of the north and northwestern lakes, at Monroe City, Michigan.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.784	.515	.687	.662	SW....	W. SW	W.....	35	60	60	49.2	S. 71 W.	2	4	5	.239	.24
.763	.461	.703	.642	W. SW.	W. SW	W.....	12	35	2	16.3	S. 68 W.	0	3	5	.237	.08
.704	.547	.706	.632	N......	NE....	E.....	12	12	4	8.0	N. 31 E..	5	6	4	.173	....
.775	.374	.641	.597	SW....	S.....	SW...	2	2	2	1.8	S. 30 W.	0	7	1	.244	....
.484	.616	.692	.567	SW....	N.....	N.....	4	12	4	4.5	N. 12 W.	7	7	0	.094	....
.845	.721	.533	.706	NW....	N.....	N.....	12	12	4	8.7	N. 19 W.	5	6	0	.069	.18
.779	.455	.832	.689	W......	NE....	N.....	4	2	2	1.4	N. 38 W.	4	6	1	.180	.08
.732	.408	.623	.621	W. SW.	NW...	NW...	4	25	2	7.2	N. 36 E..	0	1	10	.282	....
.695	.409	.460	.521	W......	W.....	W.....	25	12	2	13.0	West.....	1	2	0	.277	....
.778	.316	.653	.582	W......	NE....	NE...	2	4	12	4.9	N. 39 E..	1	0	2	.252	....
.725	.678	.628	.677	E......	NW...	NW...	4	12	4	4.5	N. 33 W.	9	9	1	.164	....
.875	.483	.630	.663	W......	E.....	NE...	4	12	4	3.7	N. 75 E..	6	4	0	.251	.08
.833	.387	.713	.644	NE....	E. SE.	W. NW	12	4	2	2.8	N. 21 E..	1	2	1	.260	....
.749	.400	.758	.636	S......	S.....	NW...	2	12	2	4.2	S. 7 W..	0	0	0	.298	....
.626	.418	.453	.499	W. SW.	W.....	NW...	12	25	12	15.0	N. 85 W.	0	3	10	.395	....
.625	.467	.698	.597	N......	NE...	NE...	12	4	12	8.7	W. 26 E.	7	0	0	.221	....
.726	.386	.484	.532	SW....	W.....	W.....	25	35	2	19.2	S. 72 W.	1	1	4	.204	....
.642	.376	.590	.636	W......	SW...	SE....	4	4	2	2.3	S. 52 W.	0	0	0	.172	....
.767	.322	.650	.580	W......	S.....	NW...	2	2	12	4.1	N. 58 W.	0	3	5	.191	....
.875	.668	.428	.637	SW....	W.....	SE...	12	25	4	11.0	S. 69 W.	5	6	2	.201	.25
.841	.673	.812	.775	SW....	SW...	W.....	12	25	2	12.8	S. 48 W.	7	7	3	.074	.04
.868	.650	.656	.725	W. SW.	W. NW	W. NW	4	25	4	10.7	N. 75 W.	10	5	0	.124	.03
.800	.529	.675	.668	W......	W.....	N.....	4	4	2	2.7	N. 76 W.	8	6	4	.164	.02
.763	.404	.428	.532	NW....	NE...	NE...	2	12	25	12.3	N. 42 E..	0	3	0	.254	....
.778	.473	.452	.568	NE....	NE...	NE...	4	35	12	17.0	N. 45 E..	0	4	4	.275	....
.772	.532	.804	.703	NW....	W.....	NE...	2	2	4	1.4	N. 8 W..	2	1	0	.262	....
.798	.630	.799	.742	NE....	E. NE.	E.....	12	25	4	13.3	N. 63 E..	6	4	4	.152	....
.804	.538	.785	.709	S......	E.....	E. NE.	2	12	12	7.8	N. 84 E..	5	7	3	.185	....
.720	.410	.756	.629	E. NE..	E. NE.	E.....	4	2	2	2.6	N. 73 E..	9	8	7	.029	....
.666	.579	.761	.669	S......	SE....	SE....	25	12	2	12.0	S. 16 E..	7	3	0	.180	.01
.753	.497	.647	.632	....	....	....	....	....	....	3.0	N. 75 W.	3.6	4.1	2.5	6.073	1.01

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.391	29.412	29.415	29.406	61	75	70	63	83	73	73.0	87	61	.510	.760	.693	.654
2	29.395	29.367	29.300	29.354	60	76	68	63	84	74	73.7	86	61	.478	.789	.604	.624
3	29.290	29.237	29.222	29.250	66	77	73	69	86	79	78.0	89	66	.599	.805	.730	.711
4	29.250	29.307	29.289	29.282	69	76	75	73	85	80	79.3	87	72	.655	.775	.800	.743
5	29.292	29.337	29.382	20.337	77	77	68	79	79	72	76.7	83	68	.900	.612	631	.714
6	29.452	29.477	29.472	29.467	65	74	72	67	81	74	74.0	84	66	.591	.745	.757	.698
7	29.490	29.421	29.354	29.422	67	79	75	69	90	83	80.7	93	66	.635	.841	.760	.745
8	29.347	29.264	29.354	29.422	74	80	77	79	89	84	84.0	92	77	.772	.901	.832	.835
9	29.152	29.149	29.154	29.152	75	76	72	80	85	75	80.0	87	75	.800	.775	.744	.773
10	29.282	29.325	29.290	29.299	70	73	68	73	81	74	76.0	84	72	.693	.703	.604	.667
11	29.278	29.219	29.244	29.247	70	78	70	72	90	86	82.7	93	67	.706	.796	.518	.673
12	29.407	29.430	29.432	29.423	69	71	68	74	81	74	76.3	67	73	.641	.624	.604	.623
13	29.541	29.510	29.433	29.495	59	69	64	62	77	67	68.7	79	59	.460	.601	.556	.539
14	29.321	29.155	29.245	29.240	59	68	67	63	71	69	67.7	72	62	.447	.644	.635	.575
15	29.351	29.433	29.486	29.423	60	64	61	63	70	64	65.7	71	62	.478	.516	.497	.497
16	29.584	29.638	29.646	29.623	53	63	55	55	71	58	61.3	70	53	.376	.469	.393	.413
17	29.642	29.551	29.598	29.597	47	66	63	49	76	68	64.3	79	47	.297	.505	.509	.511
18	29.461	29.423	29.383	29.422	55	70	64	58	79	69	68.7	81	56	.393	.612	.529	.437
19	29.398	29.358	29.348	29.368	57	72	65	60	79	69	69.3	81	57	.496	.690	.564	.560
20	29.431	29.392	29.365	29.396	59	74	66	61	83	72	72.0	84	58	.473	.718	.559	.583
21	29.401	29.332	29.[illegible]	29.328	59	75	70	62	83	74	73.0	84	60	.460	.760	.679	.707
22	29.208	29.160	29.205	29.191	69	74	70	71	79	75	75.0	81	70	.682	.772	.666	.707
23	29.313	29.378	29.493	29.395	68	70	61	70	77	68	71.7	78	68	.658	.639	.443	.613
24	29.603	29.585	29.495	29.561	53	66	65	55	75	67	65.7	76	54	.376	.519	.591	.495
25	29.476	29.418	29.355	29.416	60	73	68	62	80	72	71.3	82	60	.491	.717	.631	.613
26	29.331	29.297	29.240	29.289	61	74	70	63	83	75	73.7	86	62	.510	.718	.666	.631
27	29.210	29.165	29.155	29.177	65	71	68	68	78	70	72.0	83	67	.577	.664	.658	.633
28	29.175	29.235	29.245	29.218	63	69	68	65	73	70	69.3	79	64	.549	.655	.658	.621
29	29.311	29.360	29.453	29.375	65	66	65	67	76	69	70.7	77	66	.591	.505	.564	.553
30	29.576	29.533	29.473	29.527	64	64	60	66	73	63	67.3	74	55	.569	.476	.478	.518
31	29.394	29.218	29.070	29.224	52	73	70	54	81	77	77.7	83	53	.363	.703	.639	.568
Means....	29.379	29.357	29.344	29.360	62.9	71.8	67.6	65.6	79.9	72.4	72.6	....	....	.553	.678	.619	.617
Sept. 1	28.981	28.937	29.078	28.998	68	67	57	70	70	59	66.3	79	59	.658	.622	.439	.573
2	29.312	29.376	29.399	29.362	52	55	51	54	60	53	55.7	66	53	.363	.367	.375	.368
3	29.482	29.431	29.426	29.443	42	62	61	44	71	64	59.7	74	42	.241	.436	.497	.391
4	29.476	29.458	29.448	29.461	55	73	65	57	83	72	70.7	85	55	.407	.677	.524	.536
5	29.463	29.392	29.334	29.396	62	70	70	64	86	78	76.0	88	63	.529	.518	.625	.557
6	29.325	29.272	29.260	29.286	66	76	71	72	85	75	77.3	87	71	.559	.775	.704	.679
7	29.278	29.364	29.272	29.271	70	76	71	73	82	73	76.0	83	72	.693	.816	.701	.747
8	29.288	29.335	29.425	29.349	69	70	64	71	73	67	70.3	75	67	.682	.693	.556	.643
9	29.576	29.566	29.531	29.555	53	65	60	55	71	63	63.0	73	55	.376	.537	.478	.464
10	29.544	29.485	29.438	29.489	53	68	64	55	77	66	66.0	77	54	.376	.564	.569	.503
11	29.393	29.319	29.310	29.337	62	76	70	64	86	72	74.0	88	62	.529	.762	.706	.666
12	29.298	29.468	29.568	29.445	68	62	55	70	64	57	63.7	76	57	.658	.529	.407	.531
13	29.612	29.564	29.594	29.587	53	60	50	55	64	55	58.1	69	53	.376	.465	.376	.406
14	29.584	29.558	29.516	29.553	47	65	61	49	71	63	61.0	73	48	.297	.537	.510	.448
15	29.514	29.443	29.465	29.474	57	70	64	59	77	67	67.7	79	59	.439	.639	.556	.545
16	29.481	29.448	29.411	29.447	62	68	61	64	73	64	67.0	75	64	.529	.618	.497	.548
17	29.296	29.194	29.074	29.188	60	76	68	62	85	75	74.0	87	59	.491	.775	.591	.619
18	29.159	29.213	29.348	29.240	68	70	60	72	76	65	71.0	78	65	.631	.652	.451	.578
19	29.496	29.518	29.508	29.507	61	61	59	62	66	61	63.1	67	51	.523	.470	.473	.488
20	29.499	29.484	29.486	29.490	50	63	58	52	68	61	60.3	69	51	.334	.509	.443	.428
21	29.569	29.541	29.511	29.537	50	70	62	52	76	65	64.3	76	50	.334	.652	.516	.500
22	29.524	29.458	29.440	29.474	52	71	64	55	81	67	67.7	82	54	.349	.624	.556	.509
23	29.438	29.313	29.2[illegible]0	29.317	55	70	65	58	79	70	69.0	81	57	.393	.612	.550	.518
24	29.343	29.451	29.444	29.413	57	56	52	59	64	56	59.7	77	56	.439	.343	.335	.372
25	29.492	29.406	29.374	29.424	40	60	54	42	65	56	54.3	72	41	.221	.451	.391	.354
26	29.421	29.406	29.381	29.402	43	61	54	45	70	57	57.3	71	43	.251	.416	.378	.348
27	29.387	29.341	29.316	29.348	46	65	61	48	74	63	61.7	75	47	.284	.497	.510	.430
28	29.316	29.273	29.261	29.283	54	70	65	57	75	68	66.7	76	53	.378	.666	.577	.540
29	29.306	29.293	29.343	29.314	59	68	61	61	72	64	65.7	72	61	.473	.631	.497	.534
30	29.381	29.383	29.353	29.372	55	68	62	57	72	64	64.3	73	56	.407	.631	.529	.522
Means....	29.407	29.392	29.381	29.393	56.3	67.1	61.4	58.1	73.9	64.7	65.7	....	....	.440	.583	.512	.512

of the north and northwestern lakes, at Cleveland, Ohio.

VAPOR.				WIND.									Amount of cloudiness. (0=clear sky.) (10=sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.886	.673	.854	.804	Calm...	N	Calm..	0	2	1	0.7	North ...	0	2	4	.265	....
.831	.677	.604	.704	S. SE..	N.NW.	E	2	2	2	0.7	East	6	3	0	.289	....
.712	.648	.738	.699	SE....	S	S. by E	4	4	2	3.1	S. 20 E..	7	7	0	.346	....
.786	.747	.782	.772	SE. by E	S	S. by E	2	2	2	1.7	S. 4 W..	6	10	10	.140	....
.909	.618	.804	.777	S	NW...	....	12	2	....	3.5	S. 8 W..	10	7	0	.155	0.50
.893	.704	.903	.833	SE.....	NE ...	E. by S	2	4	2	2.1	N. 81 E..	2	0	2	.251	....
.896	.597	.673	.722	S. by E.	S. SW.	S	2	4	2	2.6	S. 8 W..	3	3	0	.287	....
.779	.660	.714	.718	S. SW..	N by W	S	4	2	2	1.4	S. 27 W.	5	5	0	.271	....
.782	.644	.858	.761	SW	W. NW	SW...	2	4	2	2.2	S. 78 W	9	4	6	.186	....
.854	.665	.720	.746	E. SE..	N. NE.	SE....	2	4	2	1.6	N. 72 W.	3	0	0	.236	0.4
.900	.567	.417	.628	S. by E.	SW ...	S. SW.	4	4	2	3.0	S. 18 W.	7	2	7	.273	....
.764	.590	.720	.691	NE	N	E	4	2	2	2.3	N. 45 E..	4	1	3	.265	....
.828	.648	.841	.772	SE.....	NE ...	S. SE.	2	4	2	1.7	S. 85 E..	0	0	3	.229	....
.776	.850	.896	.741	S. SE..	S	N	2	2	4	0.2	N. 76 E..	10	10	10	.031	....
.831	.704	.833	.789	N	NW...	N	4	4	4	3.7	N. 15 W.	7	6	5	.183	0.14
.869	.618	.816	.768	S	....	....	2	....	....	2.0	South ...	5	3	1	.195	....
.853	.563	.743	.720	S. SE..	N. by E	S. by E	2	2	2	0.8	S. 42 E..	0	4	2	.171	....
.816	.618	.747	.727	S. by E	N	N	4	2	2	0.2	N. 83 E..	7	5	0	.150	....
.822	.697	.796	.772	S	N NE.	SE....	2	4	2	1.0	N. 84 E..	0	1	0	.194	....
.822	.636	.712	.743	S. SE..	N. NE.	E	4	2	2	1.5	S. 66 E..	0	5	2	.188	....
.828	.673	.810	.770	S. SE..	N. NE.	S. SE.	2	2	2	1.0	S. 53 E..	2	7	10	.138	....
.899	.779	.768	.815	S	W	SW...	4	4	2	2.6	S. 45 W	10	9	6	.102	0.19
.898	.689	.647	.475	W	W. by N	NWbyW	4	2	25	7.7	N. 21 E..	7	0	0	.219	....
.869	.599	.893	.787	E. by S.	NE ...	SE....	2	12	2	4.5	N. 61 E..	0	0	0	.214	.04
.884	.711	.804	.796	S	N	E. SE.	2	2	2	0.7	S. 67 E..	0	2	0	.185	....
.886	.636	.768	.697	S	NW...	S. by E	2	2	4	1.5	S. 8 W..	0	0	0	.203	....
.843	.693	.898	.811	S.SE...	SW ...	E. SE.	4	2	2	2.0	S. 18 E..	10	7	4	.072	....
.890	.807	.898	.865	W.NW.	N.NW.	SW ...	12	12	2	8.3	N. 72 W	6	5	0	.110	0.41
.893	.563	.796	.751	N. NE..	N. NE.	NE ...	4	4	12	6.5	N. 37 E..	8	6	4	.187	....
.891	.588	.831	.770	SE.....	NE ...	SE....	2	2	2	1.5	S. 71 E..	4	7	0	.142	....
.867	.665	.689	.740	S. by E.	NE ...	S. by W	4	2	2	1.0	S. 22 E..	0	3	10	.151	....
.813	.661	.770	.748	....	....	....	....	....	....	0.4	S. 84 E..	4.5	4.0	2.9	6.048	1.32
.898	.848	.878	.875	SW....	W	N	4	4	25	7.7	N. 17 W.	10	5	7	.077	0.40
.867	.708	.932	.836	N	N. by W	S. SW.	12	2	2	4.1	N. 6 W..	10	7	0	.118	0.26
.836	.576	.833	.755	S. by E	....	....	2	....	....	2.0	S. 11 E..	0	0	0	.190	....
.874	.600	.668	.714	S	S	S.SE..	4	2	4	3.2	S. 9 E...	0	0	1	.228	....
.888	.417	.653	.652	S. by E.	W. SW	S. SE.	4	2	2	2.1	S. 2 W..	1	0	7	.233	....
.712	.644	.812	.722	S	N	S.SE..	2	2	2	0.7	S. 23 E..	8	7	8	.150	....
.854	.747	.902	.804	S	N.NW.	S. by E	2	2	2	0.7	SW. W..	6	8	10	.085	0.17
.899	.854	.841	.865	W. SW.	N. NW	N	4	12	12	7.7	N. 21 W.	5	5	0	.128	0.35
.869	.708	.831	.800	SE	N. NE.	E. by S	2	2	2	1.4	East	1	0	0	.138	....
.869	.608	.891	.789	S. SE..	NE ...	S.SE..	2	4	2	1.5	S. 79 E..	0	0	0	.139	....
.888	.613	.900	.800	S. by E.	S	S.SE..	4	2	4	3.2	S. 14 E..	0	4	10	.138	....
.898	.888	.874	.884	W	N	N	4	12	12	8.1	N. 10 W.	10	10	9	.061	0.75
.869	.780	.869	.839	E. SE..	NE ...	E. SE.	2	4	2	2.1	N. 79 E..	10	9	0	.078	0.2
.853	.708	.886	.816	S.SE...	N. NE	SE....	4	2	2	1.6	S. 48 E..	3	0	0	.116	....
.878	.689	.841	.803	S.SE...	NWbyW	N. NE.	4	2	12	3.2	N. 27 E..	0	0	10	.146	....
.888	.761	.833	.827	SE.....	NE ...	E. by W	4	12	2	4.9	N. 65 E..	10	1	0	.125	....
.884	.644	.681	.736	S.SE...	N. by W	S	4	2	4	2.0	S. 11 E..	6	5	0	.208	....
.808	.727	.731	.754	W	NW...	NW...	4	2	4	3.1	N. 63 W.	10	6	10	.037	....
.942	.735	.882	.853	N	NW...	N	4	2	2	2.5	N. 11 W.	10	8	10	.125	0.2
.861	.743	.825	.809	....	....	S	....	....	2	2.0	South ...	0	0	0	.094	0.10
.861	.727	.836	.808	SE	NE ...	S.SE..	4	4	2	2.2	S. 74 E..	0	0	0	.129	....
.805	.590	.841	.745	S.SE...	NE ...	S	4	2	2	1.7	S. 34 E..	0	1	0	.162	....
.816	.618	.751	.728	SE. by E	N. NE.	S. by E.	4	2	2	1.6	S. 44 E..	2	4	5	.124	....
.878	.575	.747	.713	N	N	N. by E	25	12	4	13.6	N. 1 E...	10	5	0	.138	0.12
.829	.701	.872	.811	S. by E.	N. NE.	S. by E	2	2	4	1.5	S. 26 E..	0	0	0	.133	....
.840	.570	.812	.741	S.SE...	N.	S.SE..	4	2	2	1.4	S. 00 E..	0	0	0	.117	....
.850	.593	.886	.776	S	SE....	S.SE..	4	2	4	3.2	S. 18 E..	0	7	5	.132	....
.812	.768	.840	.808	S.SE...	N.NW.	S.SE..	2	2	2	0.7	S. 23 E..	8	3	0	.096	....
.882	.804	.833	.840	S	N. by W	SE....	2	2	2	0.6	S. 36 E..	6	6	0	.087	0.6
.874	.804	.888	.855	S	N. NE.	E.SE..	2	4	2	1.2	N. 74 E..	10	7	10	.028	....
.859	.696	.829	.795	....	....	....	....	....	....	0.9	S. 26 E..	4.5	3.6	3.4	3.755	2.25

N.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Oct. 1	29.376	29.348	29.375	29.366	60	70	66	62	73	68	67.7	74	62	.491	.693	.612	.599
2	29.341	29.338	29.350	29.343	64	71	68	66	77	71	71.3	78	65	.569	.678	.644	.630
3	29.408	29.340	29.295	29.348	66	75	70	68	80	72	73.3	81	67	.612	.800	.706	.706
4	29.203	29.253	29.498	29.318	68	66	58	70	71	60	67	74	60	.658	.572	.456	.562
5	29.675	29.657	29.609	29.680	50	58	49	54	63	51	56	70	51	.308	.416	.321	.348
6	29.435	29.274	29.445	29.385	45	61	63	47	66	65	59.3	68	45	.273	.470	.549	.431
7	29.228	29.180	29.622	29.356	66	74	70	69	84	76	76.3	85	45	.599	.704	.652	.651
8	29.220	29.164	29.121	29.168	65	74	71	70	85	77	77.3	85	61	.550	.691	.678	.639
9	29.375	29.426	29.441	29.414	59	55	53	61	58	55	58	79	55	.473	.393	.376	.414
10	29.329	29.189	29.305	29.274	53	54	51	55	59	53	55.7	60	53	.376	.351	.348	.358
11	29.420	29.470	29.472	29.454	50	52	49	52	55	51	52.7	56	51	.334	.349	.321	.335
12	29.415	29.354	29.277	29.345	43	55	48	45	62	50	52.3	63	45	.251	.340	.309	.300
13	29.290	29.239	29.267	29.265	45	60	50	47	63	53	54.3	64	46	.273	.478	.321	.357
14	29.340	29.374	29.414	29.376	42	55	49	44	60	52	52	62	43	.241	.367	.308	.305
15	29.512	29.452	29.371	29.445	46	51	44	48	55	47	50	60	47	.284	.295	.249	.276
16	29.350	29.182	29.194	29.209	46	48	46	48	51	49	49.3	59	46	.284	.296	.271	.284
17	29.372	29.412	29.563	29.449	32	46	44	48	50	46	48	57	46	.284	.258	.262	.268
18	29.630	29.489	29.401	29.507	51	56	51	35	62	50	50	64	35	.142	.369	.348	.286
19	29.284	29.336	29.454	29.358	41	50	45	55	55	48	52.7	58	48	.321	.295	.260	.292
20	29.505	29.364	29.192	29.354	48	50	45	43	56	48	49	58	43	.201	.282	.260	.258
21	28.991	28.915	28.913	28.939	44	51	50	50	55	52	52.3	57	47	.309	.321	.334	.321
22	29.069	29.202	29.380	29.217	44	44	43	46	47	46	46.3	55	46	.262	.249	.238	.249
23	29.595	29.655	29.558	29.603	41	41	38	43	46	40	43.1	48	40	.231	.192	.203	.209
24	29.385	29.294	29.474	29.384	37	57	48	43	64	50	52.3	68	39	.231	.373	.309	.304
25	29.647	29.682	29.658	29.662	33	33	36	39	37	38	38.0	50	36	.194	.136	.186	.172
26	29.485	29.379	29.262	29.375	36	35	38	35	38	40	37.7	45	34	.162	.165	.203	.177
27	29.235	29.242	29.322	29.266	36	40	33	38	45	35	39.3	46	35	.186	.182	.162	.176
28	29.370	29.274	29.314	29.320	37	45	43	32	49	45	43.1	49	31	.144	.247	.251	.214
29	29.412	29.503	29.546	29.487	40	45	38	38	50	40	42.7	50	38	.207	.234	.203	.215
30	29.485	29.344	29.368	29.366	40	60	50	42	64	50	53.0	64	38	.221	.465	.321	.336
31	29.409	29.308	29.318	29.345	46	64	54	53	73	59	61.3	73	50	.232	.476	.351	.353
Means....	29.377	29.342	29.381	29.367	47.6	54.6	50.3	49.8	59.8	53.0	54.2	....	....	.320	.391	.355	.355
Nov. 1	29.389	29.274	29.353	29.339	43	64	55	47	71	60	59.3	73	46	.225	.513	.367	.365
2	29.234	28.998	29.075	29.102	50	55	41	53	59	42	51.3	64	42	.331	.380	.244	.315
3	29.240	29.352	29.518	29.370	36	40	38	38	42	41	40.3	60	38	.186	.231	.190	.199
4	29.550	29.446	29.336	29.444	30	47	39	32	52	41	41.7	58	32	.144	.257	.212	.204
5	29.222	29.187	29.392	29.267	38	47	37	40	51	39	43.3	56	37	.203	.270	.194	.223
6	29.415	29.380	29.260	29.352	32	35	30	34	38	32	34.7	54	32	.155	.165	.144	.155
7	29.298	29.337	29.364	29.333	27	32	31	29	35	33	32.7	55	28	.124	.142	.151	.139
8	29.310	29.354	29.394	29.353	30	31	30	32	34	32	32.7	36	32	.144	.139	.144	.143
9	29.493	29.529	29.552	29.525	34	38	35	36	42	37	38.3	42	32	.170	.177	.178	.175
10	29.570	29.542	29.436	29.516	30	45	36	32	48	38	39.3	49	32	.144	.260	.186	.197
11	29.334	29.191	29.170	29.231	33	48	48	35	55	50	47.7	57	35	.162	.243	.269	.225
12	29.412	29.436	29.434	29.424	40	40	35	45	45	38	42.7	56	38	.251	.182	.165	.199
13	29.585	29.562	29.539	29.562	31	43	35	33	47	37	39.0	53	32	.151	.225	.178	.184
14	29.510	29.554	29.763	29.609	36	44	37	38	49	39	42.0	59	37	.186	.223	.194	.201
15	29.929	29.942	29.913	29.928	32	37	27	35	41	39	35.0	52	29	.142	.168	.124	.145
16	29.822	29.735	29.643	29.733	30	48	46	32	54	49	45.0	56	26	.144	.356	.271	.224
17	29.597	29.640	29.660	29.633	48	48	46	50	51	48	49.7	54	48	.309	.296	.284	.296
18	29.661	29.538	29.383	29.524	43	47	50	45	50	53	49.3	54	45	.251	.283	.321	.285
19	29.180	29.095	29.038	29.105	57	47	44	59	49	46	51.3	60	40	.439	.297	.262	.333
20	28.968	29.038	29.147	29.051	40	37	37	42	40	39	40.3	59	39	.221	.181	.194	.198
21	29.220	29.235	29.210	29.222	32	34	26	34	37	28	33.0	54	38	.155	.157	.117	.143
22	29.184	29.170	29.327	29.227	28	34	34	29	38	36	34.3	40	26	.142	.144	.170	.152
23	29.515	29.517	29.493	29.508	30	28	28	32	31	29	30.7	38	29	.144	.119	.142	.135
24	29.408	29.290	29.215	29.304	23	38	31	25	42	33	33.3	44	24	.100	.177	.151	.143
25	29.189	29.172	29.210	29.190	32	40	34	33	43	36	37.3	45	31	.168	.208	.170	.182
26	29.243	29.265	29.292	29.267	32	31	28	34	34	30	32.7	40	30	.155	.139	.130	.141
27	29.154	28.966	28.936	29.015	25	29	28	27	31	30	29.3	37	26	.112	.137	.130	.126
28	28.896	28.908	28.948	28.947	31	30	28	31	33	31	31.7	36	30	.155	.132	.119	.135
29	29.019	29.022	29.192	29.078	29	31	30	30	34	32	32.0	35	29	.149	.139	.144	.144
30	29.246	29.118	29.155	29.173	30	35	35	32	38	37	35.7	40	31	.144	.165	.178	.163
Means....	29.360	29.325	29.344	29.343	34.5	40.1	35.9	36.5	43.8	39.5	39.5	....	....	.183	.213	.190	.195

survey of the north and northwestern lakes, at Cleveland, Ohio.

VAPOR.				WIND.										Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.							
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.884	.854	.895	.878	S	W.NW	SE	2	2	4	1.3	S. 15 E.	10	10	10	.000	.64
.891	.731	.850	.834	SE	NW	S.SE	4	2	2	1.3	S. 35 E.	10	7	10	.061	.27
.895	.782	.900	.859	SE	SW	S.SE	2	2	2	1.5	S. 10 E.	7	4	0	.088	.02
.898	.754	.880	.844	S.SW	W	NW	4	35	12	11.7	N. 83 W.	10	10	4	.123	.03
.738	.723	.859	.773	N	N.NE	SE	12	2	2	4.2	N. 10 E.	5	0	0	.096	.06
.847	.735	.890	.824	S.SE	S.SE	S	4	2	4	3.2	S. 14 E.	4	7	5	.107	....
.846	.605	.727	.726	S	SW.byW	S	4	4	4	2.9	S. 22 W.	5	6	0	.189	....
.751	.574	.731	.685	S	S.SW	S	4	4	2	3.9	S. 7 W.	2	4	10	.183	....
.882	.816	.869	.854	N	E	E.NE	12	2	2	4.3	N. 17 E.	10	10	10	.006	.11
.869	.700	.864	.812	E.NE	SW	N	2	2	12	3.8	N. 2 E.	10	10	10	.028	.46
.861	.805	.859	.842	N	N	N. by E	12	4	4	6.6	N. 2 E.	10	10	10	.022	.16
.840	.612	.856	.769	S.SE	S.SE	SE	2	2	2	1.9	S. 31 E.	10	0	0	.091	.11
.847	.831	.798	.825	S.SE	N.NE	S	2	2	2	0.8	S. 39 E.	5	2	0	.062	....
.806	.708	.794	.779	S SW	N	N	2	4	12	4.7	N. 3 W.	3	10	10	.074	....
.850	.681	.772	.768	E	N.NW.	S	2	2	2	0.4	S. 81 E.	10	4	10	.051	....
.850	.790	.781	.807	SW	S.SW	SW	2	4	4	3.2	S. 36 W.	10	10	0	.040	...
.850	.716	.840	.803	N.NW	NW	S	4	4	2	2.1	N. 44 W.	6	9	7	.037	.05
.698	.665	.864	.742	S. by E.	....	S	4	....	4	4.0	S. 6 E.	0	0	1	.117	....
.743	.681	.777	.734	W	NW	N	12	35	12	17.4	N. 45 W.	10	4	10	.119	....
.833	.627	.777	.746	SE	S	....	2	2	....	1.2	S. 23 E.	10	4	1	.130	....
.856	.743	.861	.820	S	S.SW.	SW	4	4	4	3.8	S. 22 W.	10	3	10	.029	....
.843	.772	.767	.794	N.NW	N.NW.	N.NW.	45	35	25	33.0	N. 57 W.	8	9	10	.097	.09
.833	.617	.820	.757	N	NW	S	4	2	4	0.7	N. 45 W.	6	8	0	.021	....
.833	.625	.856	.771	S	S	W.NW	12	4	25	8.0	S. 74 W.	10	4	10	.081	.06
.816	.619	.811	.749	N	N	N. by E	4	12	12	9.2	N. 5 E.	10	10	10	.012	.13
.797	.719	.820	.779	E.SE	E. by N	N.NE	2	2	25	8.7	N. 31 E.	10	10	10	.016	.36
.811	.607	.797	.738	N	NW	S	4	4	4	1.3	N. 45 W.	5	3	0	.042	.14
.794	.710	.840	.781	S.SE	SW	S	4	12	2	5.3	S. 28 W.	0	10	10	.069	....
.905	.646	.820	.790	SW	SW	....	4	12	....	8.0	S. 45 W.	0	0	0	.072	.15
.829	.780	.798	.802	S.SW	W.SW	W	12	4	4	5.9	S. 44 W.	7	0	0	.138	....
.598	.588	.743	.630	W.SW	S	S	2	4	2	2.3	S. 15 W.	0	0	0	.195	....
.807	.710	.789	.769	....	....	....	....	....	....	2.3	N. 46 W.	7	5.7	5.4	2.396	3.04
.698	.663	.708	.689	S. by E.	S	S	12	4	4	6.6	S. 7 E.	0	0	0	.210	....
.798	.761	.914	.825	N. by W	N.NW.	W.NW	4	2	4	2.9	N. 46 W.	10	10	10	.000	....
.811	.839	.738	.793	N.NW	W	W	4	12	2	5.3	N. 77 W.	10	10	6	.012	.57
.794	.661	.834	.759	SE	S	....	2	4	....	1.9	S. 15 E.	0	5	6	.050	....
.820	.722	.816	.786	....	N	N	....	25	25	25.0	North	10	10	10	.034	....
.792	.719	.794	.768	N	....	....	12	....	....	12.0	North	10	3	6	.057	.27
775	.698	.800	.758	E	NE	NE	2	12	25	12.8	N. 47 E.	10	10	10	.120	....
.794	.712	.794	.767	NE	SE	N	12	2	2	4.5	N. 47 E.	10	10	10	......	....
812	.661	.807	.5756	N	SW	W.SW	4	2	4	1.7	N. 77 W.	3	0	0	......	.78
.794	.777	.811	.794	SW	W.byN	S.SW	2	2	4	2.2	S. 46 W.	0	0	0	.064	....
.797	.561	.667	.675	SE	S	S	4	4	12	6.5	S. 8 E.	6	7	4	.078	.50
.840	.607	.719	.722	W	W	S	12	2	2	4.7	S. 83 W.	10	7	0	.028	....
.800	.698	.807	.768	SW	S	S	4	4	2	3.1	S. 18 W.	7	0	0	.057	....
.811	.638	.816	.755	S	SW	NE	2	4	12	2.2	N. 57 E.	3	7	9	.087	....
.698	.653	.775	.709	N	NE	NE	12	12	4	8.7	N. 36 E.	10	3	0	......	....
.794	.613	.781	.729	S.SE	S.byE.	E	12	4	12	7.7	S. 49 E.	10	7	0	......	....
.856	.790	.850	.832	S.SE	W.NW	NE	4	2	12	3.3	N. 56 E.	10	10	10	.055	.29
.840	.786	.798	.808	Calm	SE	SE	0	2	2	1.3	S. 45 E.	10	10	10	.028	.17
.787	.850	.843	.858	S	N.NE	N.NE	4	12	25	11.3	N. 25 E.	10	10	10	......	.50
.829	.732	.816	.793	N.NW	N.NW.	N	4	4	25	10.3	N. 11 W.	10	10	10	.043	1.10
.792	.712	.768	.757	N.NW	W.NW	S.SW	4	4	2	2.0	N. 60 W.	7	4	0	.047	....
.887	.628	.802	.772	S	W.NW	N	2	12	25	9.8	N. 20 W.	10	10	10	.038	....
.794	.685	.887	.789	N	W	S.SW	12	25	2	9.2	N. 23 W.	9	10	0	......	....
.746	.661	.800	.736	S	S	S	4	4	4	4.0	South	5	3	3	......	....
.893	.750	.802	.815	S. by W	NW	W	2	2	12	4.5	S. 87 W.	3	10	10	.064	....
.792	.712	.782	.762	N.NW	N.NW.	W.SW	12	25	4	13.3	N. 72 W.	10	10	10	......	....
.761	.788	.782	.777	S	S. by E	S.byW	4	4	2	3.3	S. 2 E.	10	10	10	......	....
.893	.703	.655	.760	S.SW	SW. by S	S	2	2	2	1.9	S. 19 W.	10	10	10	......	....
.890	.712	.794	.799	SE	Calm	SW	2	0	2	0.9	South	10	10	10	......	....
.794	.719	.807	.773	S.SE	S	S	4	4	2	3.3	S. 9 E.	10	9	10	......	....
.809	.707	.792	.769	....	....	....	....	....	....	1.6	N. 18 W.	8.1	7.2	6.1	......	5.70

N.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.330	29.450	29.519	29.429	33	34	30	35	37	35	35.7	40	34	.162	.157	.162	.160
2	29.670	29.616	29.482	29.589	28	30	28	38	33	30	30.7	39	30	.130	.144	.130	.135
3	29.315	29.377	29.362	29.315	28	30	28	30	33	31	31.0	39	29	.130	.132	.130	.131
4	29.378	29.322	29.171	29.290	36	33	28	28	36	35	33.0	39	28	.117	.149	.173	.113
5	29.192	29.076	29.031	29.099	28	27	26	30	30	28	29.3	38	28	.130	.113	.117	.120
6	29.137	29.276	29.391	29.265	18	15	15	19	16	16	17.0	28	15	.087	.074	.074	.078
7	29.509	29.513	29.553	29.525	18	20	19	19	21	21	30.3	22	12	.087	.085	.092	.088
8	29.511	29.318	29.414	29.414	14	27	30	16	29	52	35.7	32	13	.159	.124	.144	.109
9	29.544	29.547	29.557	29.549	15	30	23	16	32	25	34.3	33	16	.074	.144	.150	.116
10	29.546	29.444	29.396	29.462	23	43	36	23	46	38	35.7	48	22	.107	.215	.186	.170
11	29.387	29.446	29.354	29.396	36	50	43	39	56	45	46.7	57	37	.173	.212	.251	.235
12	29.439	29.414	29.451	29.438	40	48	41	40	53	43	46.3	53	42	.208	.369	.231	.236
13	29.312	29.287	29.324	29.308	43	48	51	45	50	53	49.3	53	41	.238	.309	.348	.395
14	29.317	29.277	29.167	29.254	52	53	54	54	56	57	55.7	59	50	.362	.363	.378	.368
15	29.038	29.003	28.935	29.992	53	38	31	55	41	33	43.0	56	33	.376	.190	.151	.239
16	29.043	29.088	29.262	29.131	30	30	28	32	32	29	31.0	36	29	.144	.144	.142	.143
17	29.536	29.714	29.876	29.709	25	24	34	26	36	25	25.7	28	25	.123	.106	.117	.115
18	29.941	29.666	29.465	29.691	14	27	28	15	30	29	24.7	30	14	.171	.113	.142	.109
19	29.493	29.699	29.866	29.686	33	27	28	35	29	21	28.3	35	21	.662	.124	.096	.137
20	29.984	30.016	29.966	29.989	16	23	12	17	35	13	18.3	28	12	.078	.100	.063	.080
21	29.637	29.595	29.539	29.587	12	21	28	13	23	31	22.1	32	9	.063	.090	.130	.094
22	29.518	29.504	29.346	29.456	36	40	40	37	44	43	41.0	44	30	.199	.195	.221	.205
23	29.493	29.524	29.554	29.524	34	38	32	36	40	33	38.3	44	32	.170	.203	.168	.180
24	29.455	29.389	29.409	29.418	36	36	46	38	42	48	42.7	54	31	.186	.134	.284	.202
25	29.317	29.207	29.162	29.225	48	50	50	50	55	52	52.3	56	48	.309	.295	.324	.313
26	29.001	28.871	28.882	28.915	49	50	48	50	53	50	51.0	54	43	.335	.321	.309	.322
27	29.218	29.190	29.195	29.201	34	34	32	36	37	34	35.7	50	34	.170	.157	.155	.161
28	29.226	29.212	29.165	29.201	29	41	38	31	45	41	39.0	50	31	.137	.182	.190	.170
29	29.245	29.273	29.314	29.267	40	41	35	43	44	38	41.7	46	38	.208	.218	.186	.204
30	29.215	29.121	29.133	29.156	32	30	28	34	33	29	32.0	42	29	.155	.132	.142	.143
31	29.478	29.570	29.686	29.578	27	31	21	39	33	23	28.3	34	23	.124	.132	.190	.115
Means....	29.431	29.383	29.415	29.409	30.6	34.4	32.2	32.4	37.4	34.1	34.6	....	....	.163	.174	.171	.169
1863.																	
Jan. 1	29.749	29.617	29.511	29.625	11	30	23	12	33	34	23	33	11	.061	.132	.112	.102
2	29.444	29.320	29.210	29.321	28	37	40	31	40	42	37.3	45	23	.130	.181	.221	.177
3	29.253	29.197	29.108	29.186	40	41	40	42	44	45	43.7	46	41	.221	.218	.251	.230
4	28.696	28.865	29.108	28.890	47	40	36	49	43	38	43.3	55	38	.297	.208	.186	.230
5	29.058	29.023	28.945	29.008	34	47	43	36	50	45	43.7	51	55	.170	.283	.251	.235
6	29.452	28.986	29.126	29.188	33	30	24	35	32	25	30.7	45	20	.162	.144	.117	.141
7	28.967	29.545	29.609	29.374	20	20	18	22	21	20	21.0	25	20	.085	.096	.076	.086
8	29.647	29.557	29.552	29.579	19	28	26	21	30	28	26.0	31	18	.092	.130	.117	.113
9	29.663	29.650	29.430	29.564	27	28	29	29	31	30	30.0	34	18	.124	.119	.149	.130
10	29.007	28.898	29.001	28.969	38	39	33	39	41	35	38.3	40	31	.216	.212	.162	.197
11	29.046	29.096	29.310	29.150	28	29	27	29	31	29	29.7	35	28	.142	.137	.124	.134
12	29.445	29.322	29.467	29.411	26	39	33	27	42	33	34.0	46	24	.129	.199	.188	.172
13	28.565	29.330	29.227	29.374	31	40	47	32	42	49	41.0	50	29	.162	.221	.297	.227
14	29.128	28.990	29.055	29.059	51	36	30	50	38	32	41.0	54	32	.348	.186	.144	.226
15	29.077	28.906	28.751	28.911	27	27	28	29	29	29	29.0	34	28	.124	.124	.142	.100
16	28.797	28.984	29.261	29.014	23	15	13	23	16	14	17.7	29	14	.123	.074	.067	.088
17	29.682	29.791	29.846	29.773	8.5	18	8	9	20	9	12.7	21	7	.058	.076	.051	.062
18	29.961	29.909	29.875	29.915	7	23	17	7	25	18	16.7	26	3	.039	.100	.083	.081
19	29.807	29.744	29.669	29.740	14	30	27	15	32	28	25.0	32	14	.071	.144	.136	.117
20	29.498	29.377	29.180	29.352	31	34	34	33	35	35	34.3	36	28	.132	.183	.183	.166
21	29.380	29.444	29.552	29.459	32	32	29	33	35	31	33.0	37	31	.168	.142	.137	.149
22	29.541	29.419	29.442	29.467	26	32	31	28	36	34	32.7	36	27	.117	.129	.139	.128
23	29.461	29.479	29.439	29.460	34	36	33	35	39	35	36.3	39	33	.183	.173	.162	.173
24	29.411	29.369	29.466	29.415	32	46	40	36	49	40	42.7	49	35	.129	.271	.208	.202
25	29.631	29.584	29.556	29.590	33	42	36	34	46	38	39.3	48	31	.175	.215	.186	.192
26	29.370	29.182	29.142	29.231	38	35	36	39	37	36.5	37.5	40	35	.216	.178	.205	.200
27	29.191	29.127	29.212	29.143	34	31	28	34	33	31	32.7	38	31	.196	.151	.119	.155
28	29.273	29.247	29.162	29.227	27	26	23	28	28	25	27.0	33	25	.136	.117	.300	.118
29	29.115	29.038	29.023	29.059	24	32	30	25	35	32	31.7	35	23	.117	.142	.144	.134
30	29.089	29.192	29.379	29.220	28	28	31	30	31	31	30.7	32	28	.130	.119	.174	.141
31	29.413	29.297	29.287	29.332	26	32	28	27	36	29	30.7	36	27	.129	.129	.142	.130
Means....	29.345	29.336	29.319	29.333	28.1	32.3	30.6	29.6	34.8	31.4	31.9	....	....	.148	.159	.154	.154

survey of the north and northwestern lakes, at Cleveland, Ohio.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.797	.712	.797	.769	W.NW.	NW	N.NW.	12	12	12	11.8	N. 61 W.	10	10	7	......	....
.782	.794	.782	.786	N.by W.	W. by N	SE	4	2	2	1.1	N. 26 W.	8	10	10	......	....
.782	.703	.782	.756	SW	W	W.SW.	2	12	2	5.1	S. 82 W.	10	10	10	......	....
.768	.705	.359	.611	W.SW.	SW	S.SW	2	2	12	5.2	S. 29 W.	8	0	8	......	....
.782	.675	.768	.742	NW	W	W.by S.	4	4	4	3.7	N. 79 W.	10	8	10	......	....
.845	.829	.829	.834	NW by N	N.NW.	NW	35	35	25	31.3	N. 41 W.	10	10	10	......	....
.845	.721	.850	.805	W.NW	N.NW.	W.SW	12	12	4	2.1	N. 73 W.	10	10	10	......	....
.659	.775	.794	.743	S.	S	....	4	12	....	8.0	South	10	10	10	......	....
.829	.794	.746	.789	S.SW	W.NW	SW	2	4	2	2.1	S. 74 W.	3	8	0	......	....
.864	.601	.811	.789	S	S	S	4	4	12	6.7	South	4	0	0	......	....
.726	.627	.840	.701	S	S	S	12	4	12	9.3	South	0	0	4	......	....
.750	.667	.833	.750	S	S.SE	S.SE	2	2	4	2.6	S. 17 E.	10	8	10	......	....
.762	.856	.864	.827	S	S	S	12	12	2	8.7	South	10	9	10	......	....
.867	.809	.812	.829	S. SE	S	S	4	4	12	6.5	S. 4 E.	10	10	10	......	0.54
.869	.738	.800	.802	S	W	N. NW	2	4	4	1.9	N. 73 W.	10	10	10	......	0.27
.794	.794	.887	.825	W	W	W	12	12	25	16.3	West	10	8	10	......	0.94
.876	.754	.872	.834	N	N	NW	12	12	4	9.0	N. 6 W.	10	8	3	......	0.40
.823	.675	.887	.795	S.SE	S	S	2	25	12	12.9	S. 1 E.	6	3	2	......	....
.797	.775	.855	.809	W	N	N	12	25	12	13.0	N. 18 W.	10	8	10	......	....
.834	.746	.810	.797	NE	SE	SE	12	2	4	4.4	N. 71 E.	10	0	0	......	....
.810	.700	.782	.774	S.SE	S	S	2	4	4	3.2	S. 5 E.	10	10	10	......	....
.903	.677	.829	.803	S.SW	S.by W.	SW	2	2	2	1.9	S. 27 W.	10	10	10	......	....
.802	.820	.893	.838	N	NE	SE	2	2	2	1.2	N. 54 E.	10	7	0	......	....
.811	.500	.850	.720	S.	S.	S	2	2	2	2.0	South	10	1	4	......	0.12
.856	.681	.861	.799	S	SW	S	4	4	2	3.1	S. 18 W.	10	10	10	......	0.24
.927	.798	.856	.860	S	....	SW	4	....	4	2.4	S. 23 W.	10	10	10	......	1.25
.802	.712	.792	.769	W	N	S	4	2	2	1.3	West	6	10	0	......	0.21
.788	.607	.738	.711	SW	SW	S	4	2	12	5.7	S. 15 W.	0	1	3	......	....
.750	.756	.811	.772	S.SW	NW	Calm	2	4	0	1.2	N. 74 W.	10	1	10	......	....
.792	.703	.887	.794	NE	NE	NE	25	35	45	35.0	N. 45 E.	10	10	10	......	0.40
.775	.703	.730	.736	N	N	Calm	12	2	0	4.7	North	10	5	0	......	0.69
.808	.726	.805	.779	....	....	....	....	....	....	1.7	N. 77 W.	8.5	6.9	6.8	......	4.34
.804	.708	.868	.792	S	S.	S	2	2	12	5.3	South	0	1	5	......	....
.783	.722	.829	.881	S	S.	S	12	2	25	13.0	South	8	9	7	......	....
.829	.756	.840	.808	S.SE	S.SE	S	12	4	2	5.8	S. 21 E.	10	10	10	......	0.20
.853	.750	.811	.805	S. SW	SW	W. SW	12	25	2	12.8	S. 29 W.	10	10	0	......	0.16
.832	.786	.840	.809	S	SW	S	2	4	12	5.8	S. 9 W.	4	5	9	......	0.80
.797	.794	.872	.821	N.NW.	W	W.NW	4	12	25	13.5	N. 74 W.	10	6	10	......	0.12
.721	.855	.703	.759	NW	NW	SW	12	4	2	5.3	N. 52 W.	10	10	10	......	....
.850	.782	.768	.800	SE	S.	S	2	2	2	1.8	S. 15 E.	19	9	10	......	0.50
.775	.685	.890	.783	SE	S	S.SE	2	2	4	2.5	S. 22 E.	10	7	0	......	....
.907	.824	.797	.843	S	SW	W.SW	25	4	25	15.2	S. 34 W.	10	9	10	......	....
.887	.788	.775	.817	W	W	W	2	25	12	12.8	S. 88 W.	1	8	10	......	0.10
.880	.744	1.000	.874	SE	S	Calm	2	2	0	1.2	S. 23 E.	9	1	0	......	....
.896	.829	.853	.859	SE	S	S	2	12	12	8.5	S. 3 E.	10	10	10	......	....
.864	.811	.794	.823	S. SE	W	W.NW	2	2	12	4.2	N. 77 W.	10	10	10	......	0.11
.775	.775	.887	.812	NE	NE	NE.	4	12	35	17.0	N. 45 E.	10	10	10	......	0.64
1.000	.829	.816	.882	N	NW	NW	4	35	35	24.2	N. 43 W.	10	10	10	......	1.62
.892	.702	.784	.793	W	SW	S	2	2	2	1.7	S. 45 W.	6	9	0	......	0.20
1.000	.746	.840	.862	S.SE	SW	S	2	4	4	2.9	S. 13 W.	0	0	0	......	....
.823	.794	.883	.833	SE	SE	Calm	4	2	0	2.0	S. 45 E.	6	10	10	......	....
.793	.898	.898	.833	SE	SE	SE	2	4	25	10.3	S. 45 E.	10	10	10	......	....
.803	.608	.788	.793	NE.	N	Calm	4	2	0	1.8	N. 30 E.	10	10	3	......	1.03
.768	.610	.712	.697	S.SE	S	S	2	4	2	2.6	S. 6 E.	10	10	10	......	....
.898	.726	.797	.807	SE	NE	E	2	2	2	1.6	East	10	10	10	......	....
.610	.781	.750	.714	S.SE	S.SW.	SE	4	4	2	3.0	S. 9 E.	8	3	10	......	....
.895	.691	.811	.799	SE	S.SW.	S	2	2	2	1.7	S. 7 E.	0	7	3	......	....
.907	.809	.950	.888	Calm	N	NE	0	2	2	1.2	N. 23 E.	10	10	10	......	0.15
1.000	.800	.685	.828	NE	NE	NE	4	4	25	11.0	N. 45 E.	10	10	10	......	0.83
.883	.763	.746	.799	NE.	N	N	12	4	12	8.7	N. 19 E.	10	10	10	......	0.30
.872	.698	.794	.788	S	S.SW.	S	2	4	2	2.6	S. 11 W.	7	6	0	......	....
.782	.685	.300	.822	W	W	W	4	12	12	9.3	West	8	10	10	......	....
.880	.610	.887	.792	W	S	S.SE	2	4	2	2.0	S. 12 W.	9	1	0	......	....
.847	.756	.828	.810	....	....	....	....	....	....	1.7	S. 50 W.	7.9	7.7	7.0	......	5.43

N.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	29. 092	28. 888	29. 176	29. 019	29	28	29	30	30	30	30	33	25	. 149	. 130	. 149	. 143
2	29. 426	29. 430	29. 443	29. 433	17	18	15	18	20	16	18	25	16	. 083	. 076	. 074	. 077
3	29. 584	29. 642	29. 776	29. 667	5	7	8	6	8	9	7. 7	16	5	. 043	. 048	. 051	. 047
4	29. 938	29. 936	29. 787	29. 887	9	15	10	10	17	11	12. 7	17	8	. 054	. 063	. 057	. 058
5	29. 512	29. 332	29. 227	29. 357	17	24	26	18	26	28	24. 0	29	16	. 083	. 106	. 117	. 102
6	29. 253	29. 317	29. 467	29. 346	21	20	22	23	22	23	22. 7	28	22	. 090	. 085	. 107	. 094
7	29. 583	29. 522	29. 580	29. 562	15	33	25	16	36	27	26. 3	36	14	. 074	. 149	. 112	. 112
8	29. 690	29. 637	29. 580	29. 636	19	31	30	20	33	32	28. 3	33	19	. 092	. 151	. 144	. 129
9	29. 530	29. 349	29. 232	29. 370	34	41	45	35	42	46	41. 0	46	32	. 183	. 244	. 286	. 238
10	29. 615	29. 669	29. 659	29. 648	31	32	30	32	32	31	31. 7	46	30	. 162	. 181	. 155	. 166
11	29. 566	29. 460	29. 347	29. 457	26	33	35	28	35	36	33. 0	36	26	. 117	. 162	. 191	. 157
12	29. 131	29. 190	29. 462	29. 261	33	32	26	33	32	27	30. 7	36	27	. 188	. 181	. 129	. 166
13	29. 654	29. 688	29. 721	29. 688	23	30	23	24	32	24	26. 7	35	22	. 112	. 144	. 112	. 122
14	29. 513	29. 240	29. 170	29. 314	23	42	43	24	46	46	38. 7	46	21	. 112	. 215	. 238	. 188
15	29. 407	29. 501	29. 541	29. 483	22	34	30	24	39	32	31. 7	47	21	. 095	. 131	. 144	. 123
16	29. 765	29. 770	29. 648	29. 728	25	29	27	27	32	28	29. 0	33	26	. 112	. 126	. 136	. 125
17	29. 540	29. 451	29. 386	29. 459	27	40	31	28	40	32	34. 3	43	26	. 136	. 208	. 162	. 169
18	29. 313	29. 227	29. 155	29. 232	34	41	40	35	45	41	40. 0	46	30	. 183	. 215	. 235	. 207
19	29. 056	28. 890	28. 743	28. 899	40	42	38	41	45	40	42. 0	46	39	. 235	. 228	. 203	. 222
20	29. 039	29. 275	29. 464	29. 266	33	30	30	34	33	32	33. 0	40	32	. 175	. 132	. 144	. 150
21	29. 735	29. 765	29. 646	29. 715	21	22	16	22	25	17	21. 0	32	17	. 101	. 084	. 078	. 088
22	29. 367	29. 333	29. 452	29. 384	15	20	17	16	23	18	19. 0	24	15	. 174	. 174	. 083	. 077
23	29. 686	29. 691	29. 612	29. 639	18	31	21	9	34	23	22. 0	35	8	. 051	. 139	. 090	. 094
24	29. 517	29. 519	29. 544	29. 527	20	27	22	21	30	24	25. 0	32	17	. 096	. 113	. 095	. 101
25	29. 506	29. 462	29. 404	29. 457	22	40	36	23	40	38	34. 7	45	17	. 107	. 208	. 186	. 200
26	29. 109	29. 013	29. 078	29. 067	41	48	38	42	50	40	44. 0	52	39	. 244	. 309	. 213	. 252
27	29. 218	29. 382	29. 497	29. 365	35	37	31	36	40	34	36. 7	45	34	. 191	. 181	. 139	. 170
28	29. 541	29. 397	29. 163	29. 367	26	40	32	28	45	34	35. 7	45	27	. 117	. 182	. 155	. 151
Means . . .	29. 461	29. 414	29. 409	29. 428	23. 9	30. 9	28. 3	25. 1	33. 5	29. 2	29. 3	. . . .	. . . .	. 120	. 148	. 141	. 136
March 1	28. 864	29. 068	29. 222	29. 051	32	32	32	34	34	34	34	39	30	. 155	. 155	. 155	. 155
2	29. 241	29. 138	29. 153	29. 177	30	40	32	31	42	35	36. 3	43	30	. 155	. 208	. 142	. 168
3	29. 169	29. 250	29. 427	29. 292	30	28	22	31	29	23	27. 7	35	23	. 155	. 142	. 117	. 135
4	29. 592	29. 669	29. 686	29. 649	17	22	21	18	24	21	21. 0	26	18	. 083	. 195	. 196	. 191
5	29. 746	23. 559	29. 277	29. 528	14	30	32	15	33	33	27. 0	33	14	. 171	. 132	. 165	. 124
6	29. 129	29. 244	29. 312	29. 228	37	38	33	39	41	35	38. 3	42	32	. 194	. 190	. 162	. 182
7	29. 228	29. 180	29. 145	29. 184	26	27	25	28	29	27	28. 0	35	26	. 117	. 124	. 112	. 118
8	29. 037	29. 073	29. 068	29. 066	26	33	30	28	37	32	33. 3	39	26	. 117	. 136	. 144	. 132
9	29. 306	29. 387	29. 462	29. 385	23	31	25	25	34	27	28. 7	34	23	. 100	. 139	. 112	. 117
10	29. 474	29. 277	29. 180	29. 310	22	36	29	24	40	31	31. 7	41	23	. 095	. 160	. 137	. 130
11	29. 169	29. 232	29. 297	29. 233	27	30	23	30	32	26	29. 3	33	26	. 113	. 144	. 089	. 115
12	29. 442	29. 487	29. 438	29. 456	18	21	19	19	21	20	20. 0	26	18	. 087	. 196	. 092	. 092
13	29. 527	29. 507	20. 450	29. 495	13	24	18	14	26	19	19. 6	27	11	. 067	. 106	. 087	. 087
14	29. 384	29. 282	29. 247	29. 304	21	28	25	22	30	27	26. 3	33	17	. 101	. 130	. 112	. 114
15	29. 180	29. 196	29. 205	29. 160	20	36	23	22	39	25	28. 7	39	21	. 085	. 173	. 100	. 119
16	29. 399	29. 434	29. 442	29. 425	23	31	27	24	34	29	29. 0	36	23	. 112	. 139	. 124	. 125
17	29. 374	29. 219	29. 277	29. 290	30	53	41	32	60	43	45. 0	61	27	. 144	. 310	. 231	. 228
18	29. 512	29. 618	29. 671	29. 600	33	34	27	34	38	30	34. 0	41	30	. 175	. 144	. 113	. 144
19	29. 726	29. 665	29. 663	29. 685	22	32	27	24	35	30	29. 7	36	22	. 095	. 142	. 113	. 117
20	29. 591	29. 577	29. 540	29. 569	29	36	30	32	39	33	34. 7	40	27	. 126	. 173	. 132	. 144
21	29. 404	29. 385	29. 429	29. 406	32	36	37	33	38	40	37. 0	41	33	. 168	. 186	. 181	. 178
22	29. 461	29. 388	29. 272	29. 374	34	43	39	36	47	42	41. 7	51	32	. 170	. 225	. 199	. 198
23	29. 242	29. 172	29. 162	29. 192	38	55	52	39	58	54	50. 3	64	40	. 216	. 393	. 362	. 324
24	28. 971	28. 858	29. 033	28. 954	49	45	39	51	49	41	47. 0	55	40	. 321	. 247	. 212	. 260
25	28. 939	29. 023	29. 071	29. 011	31	36	31	33	38	32	34. 3	41	32	. 151	. 186	. 162	. 166
26	29. 157	29. 305	29. 390	29. 284	27	31	29	28	34	31	31. 0	35	27	. 136	. 139	. 137	. 137
27	29. 463	29. 416	29. 294	29. [illegible]91	25	40	32	26	42	35	34. 3	40	25	. 123	. 231	. 142	. 162
28	29. 017	28. 943	29. 101	28. 354	34	37	27	35	40	29	34. 7	40	29	. 183	. 181	. 124	. 163
29	29. 337	29. 447	29. 587	29. 454	20	25	27	21	27	29	25. 7	33	20	. 096	. 112	. 124	. 110
30	29. 652	29. 567	29. 356	29. 525	24	35	28	25	38	30	31. 0	40	21	. 117	. 165	. 130	. 137
31	29. 085	29. 018	29. 182	29. 095	30	35	23	31	38	24	31. 0	38	24	. 155	. 165	. 112	. 144
Means . . .	29. 317	29. 268	29. 324	29. 303	27. 1	34. 0	29. 1	28. 5	36. 9	31. 2	32. 2	. . . .	. . . .	. 135	. 169	. 145	. 150

survey of the north and northwestern lakes, at Cleveland, Ohio.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky,) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.890	.782	.890	.854	SE	S	SW	2	12	12	7.7	S. 18 W.	10	10	2	......	....
.840	.702	.829	.790	W	W. SW	W	4	4	25	1.7	S. 87 W.	9	7	10	......	0.2
.760	.777	.784	.774	NW	NW	N	12	12	4	9.0	N. 39 W.	10	10	9	......	....
.791	.671	.797	.753	SE	E	E. SE	2	2	2	1.9	S. 67 E.	10	10	10	......	....
.840	.754	.768	.787	S	E. SE	E. SE	4	12	4	6.0	S. 56 E.	10	10	10	......	....
.730	.721	.864	.772	SW	SW	S	4	2	2	2.5	S. 34 W.	10	10	10	......	0.60
.829	.705	.761	.765	S	S	S	2	12	2	5.3	South	0	3	6	......	....
.850	.800	.794	.815	S	N	NE	2	2	2	1.7	N. 45 E.	3	10	10	......	....
.898	.914	.921	.911	SE	S.SE	S	2	4	35	13.5	S. 4 E.	10	10	10	......	0.18
.896	1.000	.893	.929	W	W	Calm	35	4	0	9.7	West	10	10	10	......	....
.768	.797	.900	.822	SE	NE	Calm	2	2	0	0.9	East	10	10	10	......	....
1.000	1.000	.880	.960	NE	NE	N	4	25	25	16.7	N. 24 E.	10	10	10	......	0.17
.868	.794	.868	.843	N	N	SE	2	2	2	1.0	N. 29 E.	7	0	0	......	0.35
.868	.691	.767	.775	S	S	S	2	25	35	20.7	South	0	10	0	......	....
.738	.547	.794	.693	SW	W	N	2	12	2	4.5	N. 87 W.	7	0	0	......	0.5
.761	.694	.883	.779	N	N	E	2	2	2	1.5	N. 27 E.	0	0	10	......	....
.883	.750	.896	.843	N	NE	Calm	2	2	0	1.2	N. 23 E.	4	0	0	......	....
.898	.684	.912	.831	SE	E. SE	SE	2	2	4	2.6	S. 53 E.	10	8	10	......	....
.912	.762	.820	.832	S. SE	S. SE	Calm	2	2	0	1.3	S. 11 E.	10	10	10	......	....
.895	.703	.794	.797	W	NW	NE	12	12	25	9.0	N. 6 W.	10	7	10	......	0.32
.860	.622	.834	.772	N. NE	NE	NE	4	12	25	13.5	N. 43 E.	10	8	10	......	....
.829	.598	.840	.756	NE	NE	NE	12	12	2	8.7	N. 45 E.	10	10	10	......	0.41
.784	.712	.730	.742	S	SE	Calm	2	2	0	1.2	S. 23 E.	10	0	0	......	0.28
.855	.675	.738	.756	S. SE	W. SW	S	2	2	2	1.5	S. 13 W.	10	10	0	......	....
.864	.750	.811	.801	S. SE	S	Calm	2	2	0	1.3	S. 12 E.	10	7	10	......	....
.914	.856	.820	.863	S	S.SE	W	12	4	4	5.3	S. 9 W.	10	10	10	......	0.14
.900	.732	.712	.781	W	W	W	4	4	2	3.3	West	10	1	10	......	....
.768	.607	.792	.723	S	NE	N	2	4	2	1.3	N. 45 E.	3	6	7	......	....
.846	.783	.322	.817	....	....	....	....	....	....	0.9	S. 83 W.	8.0	7.0	7.3	......	3.35
.792	.792	.792	.792	NE	W.NW	W	4	25	2	8.5	N. 61 W.	10	8	10	......	0.36
.893	.750	.698	.780	S	S	W	2	2	2	1.5	S. 27 W.	0	10	10	......	0.36
.893	.887	.864	.881	W. NW.	NW	NE	12	4	12	5.6	N. 19 W.	10	10	10	......	0.7
.840	.738	.855	.811	NW	W.NW	N. NE	2	4	2	2.1	N. 43 W.	1	5	10	......	0.5
.823	.713	.833	.816	S	S	S	2	12	35	16.3	South	0	10	10	......	....
.816	.738	.797	.784	S	W.SW	Calm	25	4	0	8.9	S. 8 W.	10	1	6	......	....
.768	.775	.761	.768	NE	NE	NE	12	25	2	13.0	N. 45 E.	10	10	10	......	....
.768	.619	.794	.727	S	S	W	2	2	2	1.5	S. 27 W.	10	10	10	......	0.39
.746	.712	.761	.739	W. SW.	W	S	12	25	2	12.3	S. 80 W.	4	2	0	......	0.4
.738	.645	.788	.724	S	S	S	2	2	2	2.0	South	0	10	0	......	....
.675	.794	.634	.761	S	W.NW	NW	4	12	12	7.2	N. 65 W.	0	6	10	......	....
.845	.855	.850	.850	N	W	NW	2	4	25	9.7	N. 48 W.	10	10	6	......	0.38
.816	.754	.845	.805	W	W	S	2	12	2	4.7	S. 82 W.	2	5	0	......	0.3
.860	.726	.746	.731	S. SW	N	N	2	2	2	1.7	N. 20 W.	9	10	0	......	....
.721	.726	.746	.731	SE	E	NE	2	2	4	2.1	N. 77 E.	0	10	10	......	....
.868	.712	.775	.785	NW	W	Calm	2	2	0	1.2	N. 67 W.	10	0	0	......	....
.794	.599	.833	.742	S	S	NE	2	4	12	3.0	N. 73 E.	0	6	10	......	....
.895	.628	.675	.733	NE	NE	Calm	12	4	0	5.3	N. 45 E.	10	2	0	......	0.21
.738	.698	.675	.704	E	NE	NE	2	25	4	10.0	N. 48 E.	10	7	10	......	....
.694	.726	.703	.708	E	E. NE	E	4	4	25	10.7	N. 87 E.	10	10	10	......	....
.893	.811	.732	.812	S	S	S	35	12	2	16.3	South	10	10	10	......	0.26
.812	.698	.744	.748	S. SW	N	Calm	2	4	0	1.7	N. 20 W.	10	3	3	......	0.3
.907	.816	.867	.863	S	SE	SE	12	4	12	8.7	S. 26 E.	10	7	3	......	0.41
.859	.710	.824	.798	S. SE	S	W	25	35	4	20.0	S. 10 W.	10	10	10	......	0.2
.800	.811	.896	.836	W. NW.	W.NW	W	12	4	4	6.5	N. 71 W.	10	10	10	......	0.42
.883	.712	.788	.794	W	NW	W	4	4	4	3.7	N. 75 W.	10	7	10	......	0.11
.876	.829	.698	.801	S	NE	Calm	2	4	0	1.0	N. 74 E.	2	3	0	......	....
.898	.732	.775	.802	S. SE	W	NE	2	4	25	10.5	N. 43 E.	10	10	10	......	....
.855	.761	.775	.797	N	NW	N	25	12	2	12.2	N. 13 W.	10	7	0	......	0.8
.872	.719	.782	.791	S	NW	Calm	2	4	0	1.0	N. 74 W.	0	6	6	......	....
.890	.719	.868	.827	NW	W.NW	NW	2	2	45	15.3	N. 69 W.	7	10	10	......	....
.823	.740	.782	.782	....	....	....	....	....	....	0.9	S. 83 W.	6.6	7.2	6.5	......	3.2

N.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°						
April 1	29.292	29.245	28.986	29.174	18	26	32	19	28	34	27.0	34	17	.187	.117	.155	.120
2	28.629	28.783	28.955	28.789	41	39	36	42	42	38	40.3	47	34	.244	.199	.186	.210
3	29.164	29.454	29.589	29.402	29	36	28	31	40	30	33.7	43	28	.137	.160	.130	.142
4	29.692	29.673	29.499	29.600	25	33	25	26	37	29	30.7	41	23	.133	.136	.124	.128
5	29.386	29.309	29.187	29.294	31	38	37	32	41	39	37.3	45	26	.162	.191	.194	.182
6	29.138	29.165	29.285	29.294	38	32	29	40	34	30	34.7	40	30	.213	.155	.149	.169
7	29.383	29.496	29.594	29.491	29	31	37	30	35	29	31.3	37	28	.149	.128	.124	.134
8	29.565	29.639	29.614	29.603	28	31	29	30	34	31	31.7	36	29	.130	.139	.137	.135
9	29.649	29.626	29.506	29.593	25	38	35	26	41	37	34.7	44	23	.133	.190	.178	.164
10	29.363	29.262	29.219	29.281	38	55	60	40	61	62	54.3	63	36	.203	.354	.491	.349
11	29.194	29.119	29.122	29.148	54	65	47	61	75	49	61.7	76	49	.325	.483	.297	.335
12	29.292	29.391	29.444	29.376	38	38	33	39	41	35	38.3	49	35	.216	.190	.162	.189
13	29.501	29.499	29.444	29.481	28	40	32	31	44	35	36.7	46	30	.119	.195	.142	.152
14	29.420	29.352	29.264	29.345	29	43	42	30	46	44	40.0	49	28	.149	.238	.241	.209
15	29.222	29.204	29.204	29.211	45	50	43	49	53	45	49.0	55	42	.247	.321	.251	.273
16	29.248	29.295	29.304	29.282	39	38	37	40	40	39	39.7	50	38	.225	.203	.194	.207
17	29.322	29.304	29.314	29.313	39	44	40	40	48	43	43.7	50	38	.225	.236	.208	.220
18	29.342	29.282	29.242	29.289	45	46	44	46	50	47	48.0	62	43	.286	.245	.249	.260
19	29.182	29.169	29.272	29.208	45	50	42	47	55	44	48.6	43	55	.273	.295	.241	.270
20	29.364	29.462	29.496	29.411	45	54	50	46	56	50	51.0	64	42	.273	.295	.241	.270
21	29.546	29.471	29.416	29.478	50	60	50	52	70	58	61.0	72	41	.286	.391	.321	.333
22	29.382	29.344	29.257	29.328	47	50	50	49	52	52	51.0	60	48	.334	.385	.309	.343
23	29.284	29.197	29.174	29.218	46	45	42	48	48	44	46.7	52	43	.297	.334	.334	.322
24	29.153	29.147	29.204	29.168	44	50	42	45	53	45	47.7	56	40	.284	.260	.241	.262
25	29.367	29.444	29.426	29.412	35	44	38	38	47	41	42.0	51	38	.275	.321	.228	.275
26	29.486	29.534	29.468	29.490	37	43	41	38	47	43	42.7	56	33	.165	.249	.190	.201
27	29.440	29.373	29.378	29.397	35	56	51	38	62	54	51.3	66	33	.207	.136	.231	.191
28	29.145	29.088	29.065	29.099	46	55	50	50	58	52	52.7	59	47	.165	.369	.335	.290
29	29.038	29.157	29.167	29.141	45	43	42	47	46	44	45.7	54	44	.273	.238	.241	.251
30	29.240	29.292	29.296	29.276	41	50	45	44	53	47	48.0	59	42	.218	.321	.273	.271
Means....	29.316	29.326	29.313	29.318	37.8	44.1	40.1	39.8	47.9	42.5	......	....	....	.213	.259	.229	.234
May 1	29.342	29.378	29.236	29.319	41	55	52	43	62	55	53.3	75	37	.231	.340	.349	.307
2	29.259	29.248	29.246	29.251	48	54	48	55	63	52	56.7	70	48	.243	.298	.282	.274
3	29.257	29.186	29.158	29.197	45	52	50	48	57	53	52.7	60	45	.260	.322	.321	.301
4	29.133	29.158	29.125	29.139	45	50	47	47	55	49	50.3	57	46	.273	.295	.297	.288
5	28.978	28.958	29.030	28.989	48	40	39	49	43	41	44.3	51	41	.322	.208	.212	.247
6	29.089	29.188	29.234	29.170	41	40	40	42	43	42	42.3	47	41	.244	.208	.221	.224
7	29.215	29.218	29.218	29.217	39	45	42	40	48	44	44.0	51	39	.225	.260	.241	.242
8	29.302	29.306	29.293	29.300	42	54	48	43	58	51	50.7	62	36	.254	.365	.296	.305
9	29.329	39.348	29.311	29.329	....	60	58	43	64	62	56.3	68	43	....	.465	.429	.447
10	29.351	29.291	29.263	29.302	57	68	65	62	80	70	70.7	82	57	.399	.524	.550	.491
11	29.371	29.332	29.310	29.338	60	72	68	68	84	74	75.3	87	65	.411	.623	.604	.546
12	29.345	29.383	29.433	29.387	58	64	55	65	70	58	64.3	74	58	.389	.516	.393	.453
13	29.384	29.309	29.278	29.324	55	58	57	57	63	60	60.0	71	54	.407	.416	.426	.416
14	29.204	29.351	29.381	29.312	53	45	46	54	50	49	51.0	61	46	.389	.234	.271	.298
15	29.442	29.366	29.268	29.359	45	52	50	47	59	54	53.3	61	43	.273	.296	.308	.292
16	29.063	29.040	29.161	29.088	51	58	51	55	63	56	58.0	69	50	.321	.416	.308	.338
17	29.206	29.238	29.313	29.253	45	52	49	48	62	52	54.0	62	42	.260	.256	.308	.275
18	29.403	29.459	29.431	29.431	45	50	48	48	56	52	52.0	60	45	.260	.282	.28	.275
19	29.512	29.497	29.413	29.474	45	58	56	50	67	62	59.7	79	45	.234	.363	.369	.322
20	29.486	29.481	29.465	29.477	56	68	62	60	75	68	67.7	82	58	.396	.591	.476	.488
21	29.591	29.588	29.530	29.570	52	70	65	59	82	72	71.0	88	56	.296	.572	.524	.864
22	29.641	29.560	29.470	29.557	56	69	61	60	80	71	70.3	83	55	.396	.561	.469	.475
23	29.433	29.305	29.235	29.324	58	68	66	63	82	72	72.3	83	60	.416	.497	.559	.491
24	29.331	29.243	29.213	29.262	57	61	60	61	73	70	68.0	83	58	.412	.876	.385	.391
25	29.196	29.190	29.188	29.191	57	70	60	62	75	64	67.0	80	59	.399	.666	.465	.510
26	29.308	29.293	29.303	29.301	55	65	60	59	72	64	65.0	72	57	.380	.524	.465	.456
27	29.401	29.401	29.381	29.394	58	65	60	63	73	64	66.7	78	56	.416	.510	.465	.497
28	29.446	29.408	29.351	29.402	55	64	60	60	74	65	69.7	77	53	.367	.462	.451	.427
29	29.298	29.125	29.010	29.144	62	70	58	66	76	65	69.0	83	58	.502	.652	.389	.514
30	28.877	28.847	28.825	28.850	64	66	66	67	76	71	71.3	80	67	.556	.505	.572	.544
31	28.782	28.822	28.832	28.809	63	60	60	65	65	63	63.3	73	63	.549	.451	.478	.493
Means....	29.289	29.284	29.255	29.276	51.9	58.8	55.1	54.8	66.1	59.5	60.1	....	....	.349	.421	.392	.387

survey of the north and northwestern lakes, at Cleveland, Ohio.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1. 000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.845	.768	.792	.802	NW	SW	S. SW.	4	12	12	7. 7	S. 43 W.	6	10	0	......	0. 14
.914	.714	.811	.823	S	W	S	25	12	2	11. 1	S. 24 W.	10	4	0	......	....
.788	.645	.782	.738	N	N	NE	2	4	12	5. 6	N. 30 E.	8	1	0	......	0. 3
.876	.619	.778	.757	NE	N. NE.	NE	2	4	4	3. 2	N. 36 E.	0	0	0	......	....
.896	.738	.816	.817	N	W	S	2	4	2	1. 3	West	0	0	0	......	....
.820	.792	.890	.834	S	W	W.NW	2	4	35	12. 7	N. 37 W.	10	10	10	......	0. 40
.890	.628	.775	.764	N. NW.	NW	N	12	2	2	5. 2	N. 23 W.	10	10	10	......	0. 26
.782	.712	.788	.761	NW	NW	Calm	2	2	0	1. 3	N. 45 W.	10	10	10	......	....
.876	.738	.807	.807	SE	NE	S	2	4	2	1. 4	S. 82 E.	0	0	0	......	....
.820	.659	.884	.788	S	S	S	12	25	2	13. 0	South	10	10	10	......	....
.606	.558	.853	.672	S	S	W	12	35	4	15. 7	S. 5 W.	10	4	10	.384	....
.907	.738	.797	.814	NW	W.NW	N	12	4	4	6. 2	N. 41 W.	10	10	9	.018	0. 58
.685	.677	.698	.683	N	NE	Calm	2	4	0	1. 8	N. 30 E.	0	1	0	.048	....
.890	.767	.836	.831	SE	NE	NE	2	12	2	4. 7	N. 53 E.	4	7	4	.167	....
.710	.798	.840	.783	SE	E. SE	E	4	4	2	3. 2	S. 63 E.	6	10	10	.022	....
.910	.820	.816	.849	NE	NW	Calm	12	4	0	4. 2	N. 27 E.	10	10	....	.031	0. 15
.910	.704	.750	.788	W	NW	S.	2	2	2	1. 2	S. 80 W.	10	10	10	.080	0. 2
.921	.653	.772	.782	SE	NE	Calm	2	4	0	1. 5	N. 73 E.	10	0	0	.164	....
.847	.681	.836	.788	SE	NE	NE	2	25	2	9. 0	N. 49 E.	0	6	10	.114	....
.921	.872	.798	.864	W	NE	S	2	12	2	3. 0	N. 45 E.	10	0	0	.135	0. 2
.861	.525	.641	.676	SE	SE	SE	12	25	12	16. 3	S. 45 E.	0	7	10	.238	....
.853	.861	.861	.858	SE	SE	S	12	12	2	8. 5	S. 41 E.	10	10	3	.000	....
.850	.777	.836	.821	S. SE	NE	NE	2	12	2	4. 5	N. 53 E.	10	10	10	.050	0. 21
.920	.798	.762	.827	NW	W	N	2	4	25	8. 8	N. 12 W.	0	0	6	.188	0. 2
.719	.772	.738	.743	NE	W.NW	NE	12	4	2	4. 3	N. 29 E.	0	0	0	.159	....
.905	.619	.833	.786	N	NE	Calm	2	2	1	1. 2	N. 23 E.	0	0	0	.165	....
.719	.665	.802	.729	E	NE	SE	2	4	2	2. 1	N. 77 E.	3	4	4	.202	....
.716	.816	.798	.777	SE	N. NE.	NE	2	2	2	1. 3	N. 64 E.	10	10	10	.088	....
.847	.767	.836	.813	S. SE	N	N	2	2	2	0. 7	N. 20 E.	10	10	6	.007	0. 3
.756	.798	.847	.800	NW	N	Calm	2	2	0	1. 2	N. 23 W.	8	0	0	......	....
.832	.723	.836	.797	....	....	....	....	....	....	0. 6	S. 70 E.	62	55	50	......	1. 20
.833	.612	.805	.750	SE	N	S. SE	2	2	2	0. 8	S. 61 E.	0	0	5	.142	....
.561	.519	.727	.602	SW	N	W	2	2	2	1. 2	N. 80 W.	2	3	7	.228	....
.777	.692	.798	.756	W	N. NE.	Calm	2	4	0	6. 2	N. 8 W.	6	5	10	.148	....
.847	.681	.853	.794	NE	NE	NE	2	4	2	2. 7	N. 45 E.	10	3	7	.055	.20
.826	.750	.824	.800	NE	NE	NE	2	35	25	20. 7	N. 45 E.	10	10	10	.049	0. 68
.914	.750	.829	.831	NE	NE	NE	2	12	25	13. 0	N. 45 E.	10	10	10	......	1. 21
.910	.777	.836	.841	NE	NE	NE	12	25	2	12. 0	N. 45 E.	10	6	0	.114	0. 13
.916	.756	.790	.821	E. NE.	N	SE	2	4	2	1. 5	N. 43 E.	0	3	0	.003	.01
......	.780	.772	.776	S. SE	SW	S	2	2	2	1. 7	S. 7 W.	3	10	0	.161	....
.718	.512	.751	.660	S	S. SW.	Calm	4	25	0	9. 6	S. 19 W.	10	6	3	.159	....
.601	.535	.720	.619	W	W	S	2	4	2	2. 1	S. 71 W.	5	2	4	.342	....
.631	.704	.866	.717	W. NW.	NW	N	2	12	2	5. 1	N. 42 W.	6	4	4	.505	....
.874	.723	.822	.806	NW	W	SE	2	2	4	0. 5	S. 22 W.	0	5	0	.663	....
.933	.646	.781	.787	W. NW.	NW	N	4	12	2	5. 7	N. 46 W.	10	6	0	.134	0. 30
.847	.592	.738	.726	N	W	S	2	2	2	0. 7	West	3	4	10	.043	.01
.743	.723	.687	.718	SW	W	W	12	12	4	5. 6	S. 60 W.	10	6	4	.167	.04
.777	.461	.794	.677	W	W.NW	W.NW	12	2	4	5. 8	N. 82 W.	0	7	6	.150	....
.777	.627	.727	.707	NW	W.NW	S	4	4	2	2. 2	N. 70 W.	7	2	0	.190	....
.646	.650	.665	.820	S	NW	S	2	2	2	1. 0	S. 28 W.	0	0	0	.153	....
.765	.681	.605	.714	S	NW	S	4	2	2	1. 6	S. 17 W.	0	3	0	.252	....
.592	.524	.668	.595	S	N.	S	2	2	2	0. 7	South	0	0	0	.258	....
.765	.548	.618	.644	S	N. NE.	S	2	2	2	0. 7	S. 20 E.	0	0	0	.258	....
.723	.455	.712	.630	S. SE	NE	W	4	4	12	2. 6	S. 83 W.	0	0	0	.295	....
.796	.464	.525	.395	W	NE	N. NE.	2	2	2	0. 4	S. 81 W.	2	0	0	.232	....
.718	.768	.780	.755	S	NE	N. NE.	4	12	12	6. 8	N. 41 E.	1	7	9	.296	....
.761	.668	.780	.736	S	N. NE.	E. NE	25	25	2	3. 8	S. 84 E.	0	0	0	.194	0. 20
.723	.629	.780	.711	E. SE	NE	SE	12	12	2	7. 3	N. 76 E.	6	0	0	.196	....
.708	.511	.731	.650	SE	NE	SE	4	12	2	4. 5	N. 71 E.	0	0	5	.242	....
.736	.727	.631	.715	S	NE	Calm	2	12	0	3. 6	N. 55 E.	6	7	6	.259	....
.841	.563	.754	.709	S. SW	SW	SW	12	35	2	16. 0	S. 39 W.	10	8	6	.197	.01
.890	.731	.831	.817	S. SW	W	S. SW.	25	12	12	14. 5	S. 37 W.	10	6	9	.043	0. 18
.773	.634	.782	.730	....	....	....	....	....	....	1. 6	N. 31 E.	4. 4	3. 9	3. 7	5. 618	2. 97

N.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	28. 854	28. 890	28. 943	28. 896	57	66	54	59	65	58	60. 7	66	56	. 439	. 612	. 365	. 472
2	29. 102	29. 136	29. 176	29. 138	51	64	52	54	66	56	58. 7	69	53	. 335	. 569	. 335	. 413
3	29. 257	29. 297	29. 282	29. 279	50	56	51	53	62	55	56. 7	68	48	. 321	. 369	. 321	. 337
4	29. 305	29. 209	29. 209	29. 174	46	62	58	49	68	62	59. 7	74	43	. 271	. 476	. 429	. 392
5	29. 292	29. 271	29. 319	29. 294	55	65	51	60	72	54	62. 0	78	48	. 367	. 524	. 335	. 409
6	29. 497	29. 512	29. 447	29. 485	50	57	51	52	63	54	56. 3	64	49	. 334	. 386	. 335	. 352
7	29. 562	29. 574	29. 497	29. 644	52	58	47	57	67	50	58. 0	69	48	. 322	. 363	. 283	. 323
8	29. 502	29. 484	29. 412	29. 466	53	61	56	59	71	60	63. 3	72	49	. 323	. 403	. 396	. 374
9	29. 464	29. 383	29. 298	29. 382	57	64	58	61	74	65	66. 7	79	47	. 412	. 462	. 389	. 421
10	29. 262	29. 275	29. 181	29. 239	61	68	50	67	78	69	71. 3	81	50	. 457	. 550	. 110	. 372
11	29. 174	29. 164	29. 189	29. 176	61	58	56	61	62	59	60. 7	80	50	. 537	. 429	. 409	. 458
12	29. 354	29. 341	29. 323	29. 339	62	66	60	63	73	65	67. 0	78	57	. 542	. 545	. 451	. 513
13	29. 436	29. 455	29. 401	29. 431	64	67	67	66	75	71	70. 7	81	59	. 569	. 554	. 608	. 577
14	29. 488	29. 472	29. 395	29. 452	62	73	....	65	81	72	72. 7	84	57	. 516	. 703	. 631	. 617
15	29. 375	29. 314	29. 320	29. 336	65	75	68	71	85	72	76. 0	87	63	. 537	. 733	. 631	. 634
16	29. 495	29. 445	29. 338	29. 425	58	65	60	62	73	65	66. 7	77	57	. 429	. 532	. 451	. 471
17	29. 178	29. 072	29. 045	29. 097	71	78	70	79	88	75	80. 7	91	61	. 651	. 823	. 666	. 713
18	29. 103	29. 063	29. 991	29. 052	60	68	63	62	78	67	69. 0	81	59	. 491	. 550	. 522	. 521
19	29. 052	29. 085	29. 045	29. 061	65	66	58	70	77	62	69. 7	82	60	. 550	. 492	. 429	. 490
20	29. 131	29. 133	29. 074	29. 113	60	63	55	61	68	58	62. 3	69	58	. 505	. 509	. 393	. 469
21	29. 222	29. 234	29. 236	29. 231	55	62	55	58	64	58	60. 0	66	55	. 393	. 529	. 393	. 438
22	29 257	29. 214	29. 289	29. 253	55	62	59	57	66	62	61. 7	70	53	. 407	. 502	. 460	. 456
23	29. 416	29. 561	29. 436	29. 471	61	62	57	59	69	60	62. 7	69	53	....	. 462	. 426	. 244
24	29. 507	29. 496	29. 441	29. 481	54	60	58	56	68	62	62. 0	70	51	. 391	. 411	. 429	. 410
25	29. 499	29. 431	29. 388	29. 439	55	65	66	66	70	69	63. 3	71	54	. 367	. 550	. 599	. 505
26	29. 433	29. 413	29. 368	29. 405	62	65	64	66	69	68	67. 3	74	63	. 502	. 564	. 543	. 536
27	29. 441	29. 348	29. 293	29. 361	65	65	69	68	71	72	70. 3	76	63	. 577	. 537	. 668	. 594
28	29. 308	29. 280	29. 158	29. 249	67	75	67	69	80	73	74. 0	83	65	. 635	. 800	. 581	. 672
29	29. 191	29. 117	29. 082	29. 130	67	75	71	70	80	74	74. 7	83	66	. 622	. 800	. 718	. 713
30	29. 185	29. 147	29. 197	29. 174	69	76	73	71	85	79	78. 3	86	68	. 682	. 775	. 730	. 729
Means....	29. 311	29. 290	29. 259	29. 287	59. 1	65. 6	59. 7	62. 2	72. 3	64. 2	66. 2	....	....	. 465	. 584	. 468	. 506

survey of the north and northwestern lakes, at Cleveland, Ohio.

VAPOR.				WIND.								Amount of cloudiness. (0=clear sky.) (10=sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.878	.895	.756	.843	SW....	W.by N	W.NW	12	35	35	25.3	N. 81 W.	4	7	8	.025	....
.802	.891	.747	.813	W.NW.	W....	Calm..	12	12	0	8.0	N. 79 W.	3	4	4	.216	0 30
.798	.665	.743	.735	NW....	W.NW	Calm..	4	4	0	2.6	N. 56 W.	5	6	0	.205	....
.781	.695	.772	.749	W.NW.	N.....	SE...	12	4	2	4.0	N. 53 W.	0	6	0	.024	....
.708	.668	.802	.726	SE....	N.....	NE....	4	2	12	4.6	N. 56 E..	0	1	10	.210	....
.861	.670	.802	.778	N. NE..	NW...	NW...	4	2	2	1.7	N. 24 W.	7	6	0	.252	0.10
.692	.550	.786	.676	N. NW.	NW...	N.....	12	4	2	5.8	N. 25 W.	0	1	0	.155	....
.647	.532	.765	.648	N. NW.	W.NW	N.....	4	4	4	3.5	N. 29 W.	3	1	0	.286	....
.769	.551	.631	.650	W.....	W....	Calm..	2	12	0	4.7	West....	0	0	0	.211	....
.690	.574	.155	.473	S......	N. NE.	S.....	2	2	4	1.4	S. 11 E..	3	7	10	.264	....
1.000	.772	.819	.864	E. NE..	N. NE	N. NE.	2	4	25	10.0	N. 25 E..	10	10	10	.181	0.21
.942	.672	.731	.782	W.....	W....	S.....	4	2	2	2.1	S. 71 W.	7	1	3	.089	0.46
.891	.639	.802	.777	N......	N.....	S.....	2	2	2	0.7	North...	2	0	0	.190	....
.836	.665	.804	.768	S......	W....	SE....	2	2	2	1.1	S. 10 W.	0	2	0	.192	....
.708	.609	.804	.707	S......	W....	N.....	2	12	12	5.3	S. 51 W.	0	6	7	.217	....
.772	.634	.731	.712	E......	NE....	S.....	2	12	2	4.0	N. 59 E..	0	0	0	.243	....
.657	.622	.768	.682	SW....	W....	Calm..	4	25	0	9.3	S. 84 W.	0	1	10	.202	....
.884	.574	.790	.749	SE.....	N.....	SE....	2	2	2	7.9	S. 74 E..	0	0	10	.273	....
.751	.531	.772	.685	S......	N.....	S.....	2	2	12	4.0	South...	3	0	4	.168	....
.941	.743	.816	.833	SW....	W....	NW...	12	25	12	14.0	West....	4	10	10	.194	0.32
.816	.888	.816	.837	S......	S. SW.	SE....	2	4	2	2.4	S. 1 W..	10	10	5	.082	0.10
.874	.786	.828	.829	SW....	W....	W....	12	12	12	11.2	S. 75 W.	10	10	6	.118	0.10
......	.653	.822	.738	NW....	W.NW	SE....	12	4	2	4.7	N. 51 W.	7	10	0	.116	0.08
.872	.601	.772	.748	S.SE...	NE....	S.....	2	12	2	3.5	N. 63 E..	0	0	7	.122	....
.708	.751	.846	.768	SE.....	NE....	SE....	4	12	2	4.4	N. 71 E..	0	7	4	.368	....
.786	.796	.793	.792	S......	NE....	S.....	2	4	2	1.0	S. 67 E..	7	9	0	.238	....
.843	.708	.852	.801	SE.....	NE....	S.....	4	4	4	2.3	S. 55 E..	0	7	6	.166	....
.896	.782	.716	.798	S......	S.....	S.....	4	25	25	18.0	South...	4	5	0	.114	0.82
.848	.782	.856	.829	S......	S.....	S.....	25	25	12	2.7	South...	1	7	10	.250	....
.899	.644	.738	.760	S.SW..	SW...	S.....	12	12	2	8.5	S. 32 W.	10	8	5	.162	0.17
.812	.651	.754	.739	....	....	....	....	....	....	2.5	S. 76 W.	3.3	4.7	4.3	5.534	2.66

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Aug. 1	29.466	29.400	29.408	29.425	63	72	68	64	78	71	71	83	55	.562	.704	.644	.637
2	29.461	29.437	29.371	29.423	67	72	68	70	83	70	74.3	86	63	.622	.663	.658	.648
3	29.401	29.341	29.285	29.342	68	74	69	70	89	76	78.3	90	60	.658	.637	.614	.636
4	29.340	29.346	29.352	29.346	74	77	73	78	87	77	80.7	88	70	.785	.792	.841	.809
5	29.320	29.344	29.368	29.344	73	75	71	74	80	75	76.3	81	72	.798	.800	.704	.767
6	29.544	29.560	29.568	29.557	64	68	67	65	78	71	71.3	80	56	.583	.550	.608	.580
7	29.566	29.484	29.360	29.470	63	74	75	64	81	78	75.3	87	58	.562	.704	.827	.698
8	29.342	29.317	29.200	29.286	76	79	76	77	83	78	79.3	84	75	.883	.936	.870	.896
9	29.141	29.143	29.180	29.155	77	77	71	78	81	74	77.7	82	73	.914	.873	.718	.835
10	29.196	29.359	29.356	29.304	68	69	63	68	82	68	72.7	85	63	.685	.534	.509	.576
11	29.341	29.302	29.242	29.295	65	72	76	66	81	77	74.7	88	57	.604	.663	.883	.717
12	29.416	29.437	29.476	29.443	64	68	63	68	79	68	71.7	81	65	.543	.537	.509	.530
13	29.612	29.530	29.499	29.547	59	65	59	58	78	63	66.3	80	50	....	.443	.447	.445
14	29.366	29.283	29.208	29.286	64	69	67	68	73	67	69.3	74	54	.543	.655	.662	.620
15	29.340	29.398	29.447	29.395	58	60	53	59	71	60	63.3	72	56	.469	.371	.310	.383
16	29.620	29.663	29.683	29.655	53	58	51	55	69	54	59.3	70	53	.376	.336	.335	.349
17	29.741	29.630	29.544	29.638	50	62	62	51	74	65	63.3	76	42	.348	.396	.516	.420
18	29.529	29.472	29.411	29.471	57	68	56	63	77	70	70	79	52	.386	.537	.263	.395
19	29.434	29.420	29.367	29.407	65	67	59	65	78	60	67.7	80	54	.617	.514	.487	.539
20	29.477	29.457	29.455	29.463	56	69	71	56	83	72	70.3	83	52	.449	.520	.745	.571
21	29.509	29.215	29.351	29.358	61	72	70	63	91	70	74.7	92	54	.510	.528	.733	.590
22	29.223	29.192	29.180	29.198	71	74	73	73	77	74	74.7	80	68	.731	.739	.798	.776
23	29.333	29.383	29.564	29.427	65	67	57	69	73	61	67.7	78	61	.564	.581	.412	.519
24	29.734	29.691	29.592	29.672	52	59	54	53	73	58	61.3	74	47	.375	.314	.365	.351
25	29.249	29.472	29.388	29.470	60	70	67	63	77	71	70.3	79	50	.478	.639	.608	.575
26	29.363	29.312	29.283	29.319	68	75	71	73	81	73	75.7	82	66	.618	.787	.731	.712
27	29.281	29.268	29.226	29.258	67	71	68	70	71	68	69.7	75	64	.622	.758	.685	.688
28	29.204	29.175	29.196	29.192	66	71	67	65	72	68	68.3	73	63	....	.745	.745	.745
29	29.364	29.428	29.520	29.437	59	63	55	61	71	59	63.7	72	59	.743	.469	.380	.441
30	29.688	29.613	29.567	29.623	51	58	55	52	69	56	59	72	43	.361	.336	.420	.372
31	29.485	29.309	29.120	29.305	52	68	69	53	82	71	68.7	84	45	.375	.497	.682	.518
Means...	29.422	29.399	29.379	29.400	....	69.1	65.3	64.9	77.9	68.5	70.4	....	....	.586	.601	.603	.597
Sept. 1	29.063	29.872	29.109	29.015	65	70	54	66	70	56	64	75	56	.604	.783	.391	.576
2	28.330	29.390	29.396	29.039	45	49	48	48	55	49	50.6	58	45	.260	.269	.322	.284
3	29.556	29.438	29.392	29.462	44	60	56	45	67	58	56.6	68	37	.275	.425	.422	.374
4	29.501	29.520	29.498	29.506	61	67	56	66	78	67	70.3	79	51	.470	.514	.303	.429
5	29.541	29.429	29.385	29.452	66	73	70	70	82	72	74.6	83	62	.586	.390	.706	.561
6	29.390	29.324	29.338	29.351	71	74	70	74	80	71	75.0	80	70	.718	.758	.720	.732
7	29.343	29.300	29.325	29.323	70	75	71	73	78	72	74.3	80	69	.693	.827	.745	.755
8	29.283	29.300	29.469	29.351	72	74	59	73	74	63	70.0	76	63	.771	.839	.314	.641
9	29.640	29.646	29.612	29.633	57	61	56	59	71	58	62.6	74	55	.439	.403	.422	.421
10	29.643	29.557	29.546	29.582	54	70	56	54	83	68	68.3	83	49	.418	.558	.290	.422
11	29.534	29.421	29.358	29.438	63	76	68	65	89	75	76.3	89	58	.549	.721	.591	.620
12	29.345	29.423	29.568	29.445	70	65	50	72	69	52	64.3	76	52	.706	.564	.334	.535
13	29.742	29.726	29.697	29.722	49	52	50	50	56	52	52.6	58	49	.335	.335	.334	.335
14	29.666	29.621	29.602	29.630	47	63	57	45	70	58	57.6	71	39	....	.482	.452	.467
15	29.571	29.485	29.522	29.526	52	68	61	51	72	62	61.6	75	47	....	.631	.523	.577
16	29.622	29.571	29.522	29.572	57	61	57	58	70	58	62.0	71	56	.452	.416	.452	.440
17	29.465	29.327	29.248	29.347	56	79	68	57	83	71	70.3	86	56	.436	.936	.644	.672
18	29.140	29.238	29.333	29.237	69	70	68	74	75	69	72.6	75	68	.641	.666	.671	.659
19	29.512	29.554	29.567	29.544	56	58	55	58	61	56	58.3	71	56	.422	.443	.420	.428
20	29.545	29.506	29.509	29.520	55	61	61	57	68	63	62.6	69	50	.407	.443	.510	.453
21	29.650	29.640	29.632	29.641	55	69	61	55	77	62	64.6	73	49	.420	.601	.523	.515
22	29.602	29.542	29.534	29.559	57	69	60	58	81	61	66.6	81	53	.452	.547	.505	.501
23	29.512	29.392	29.274	29.393	60	70	64	62	77	65	68.0	80	55	.491	.639	.583	.571
24	29.325	29.444	29.488	29.419	56	53	47	57	61	48	55.3	71	48	.436	.297	.310	.348
25	29.551	29.478	29.452	29.494	45	59	52	47	67	58	57.3	67	36	.273	.393	.309	.325
26	29.508	29.443	29.475	29.475	45	63	55	48	69	57	58.0	70	40	.260	.495	.407	.387
27	29.526	29.445	29.377	29.449	55	65	55	45	76	56	59.0	72	42	....	.470	.420	.445
28	29.381	29.328	29.286	29.332	50	65	62	51	75	64	63.3	76	50	.348	.483	.529	.453
29	29.341	29.348	29.422	29.370	66	67	87	66	71	58	65.0	73	56	.639	.608	.452	.566
30	29.523	29.561	29.546	29.543	53	50	48	54	51	49	51.3	60	49	.389	.348	.322	.386
Means....	29.445	29.441	29.520	29.469	....	62.5	58.2	58.6	70.5	60.9	63.3	....	....	....	.541	.464	.494

of the north and northwestern lakes, at Buffalo, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.943	.734	.850	.842	S	SW	S	2	12	2	5.0	S. 34 W	0	2	0	......	....
.848	.627	.898	.738	S	SW	E	4	4	2	2.3	S. 7 W	10	2	0	......	....
.898	.466	.685	.683	SE	W. SW	SE	2	2	4	1.9	S. 26 E	9	10	1	......	....
.819	.618	.907	.781	S	W. SW	S	4	12	2	5.2	S. 46 W	10	7	10	......	....
.951	.782	.812	.848	S	W. SW	NW	12	12	2	6.6	S. 39 W	10	7	2	......	....
.944	.574	.802	.773	NW	W. SW	N.NW.	4	12	2	4.9	West	0	4	0	......	....
.943	.605	.863	.804	E	SW	SW	2	4	4	2.2	S. 33 W	10	4	1	......	....
.953	.830	.908	.897	W.SW	W. SW	SW	12	25	12	16.0	S. 62 W	10	10	8	......	....
.954	.826	.856	.879	SW	W. SW	NW	12	35	12	17.0	S. 75 W	8	6	70	......	....
1.000	.489	.743	.774	E.NE	E.NE	E.NE	4	4	2	3.3	N. 67 E	8	3	0	......	.42
.945	.627	.953	.842	S.SE	E.NE	W	4	4	12	2.4	S. 72 W	3	10	8	......	....
.793	.542	.743	.693	NW	W. SW	NW	2	12	4	5.1	S. 88 W	0	4	0	......	.02
......	.463	.776	.625	NE	W. SW	E.NE	2	4	2	0.3	N. 36 W.	0	10	1	......	....
.793	.807	1.000	.807	S.SW	W. SW	W	4	4	2	3.0	S. 54 W	10	10	10	......	....
.939	.490	.599	.676	W	NE	NW	4	12	4	3.8	N. 9 E	10	4	0	......	.36
.869	.475	.802	.715	N.NE	W.NW	E.NE	4	12	2	4.0	N. 41 W	9	4	0	......	....
.929	.472	.836	.746	E	W. SW	S.SE	2	4	2	1.1	S. 15 W	0	0	7	......	....
.670	.542	.359	.524	S	W. SW	W. SW	12	12	2	7.2	S. 36 W	7	4	1	......	....
1.000	.537	.940	.826	W.SW	W. SW	E.NE	2	4	2	1.3	S. 68 W	9	2	2	......	....
1.000	.461	.950	.804	E.NE	S.SW	SW	2	2	2	0.8	S. 10 W	0	2	3	......	....
.886	.363	1.000	.750	E. SE	S	S.SW	2	2	4	2.1	S. 3 E	1	2	10	......	....
.902	.862	.951	.905	S.SW	SW	SW	25	12	12	16.0	S. 33 W	10	8	10	......	.28
.796	.716	.769	.760	W.SW	NW	W.NW	4	4	2	2.8	N. 76 W	3	7	0	......	.10
.932	.387	.756	.692	NE	NE	E	4	12	2	5.8	N. 50 E	0	0	0	......	.14
.831	.689	.802	.774	NE	S	W	4	2	2	0.3	N. 45 E	2	1	3	......	....
.761	.784	.902	.816	W.SW	S	SW	4	4	2	2.8	S. 36 W	0	2	3	......	....
.848	1.000	1.000	.949	W.NW	W. SW	S	2	4	2	2.0	S. 34 W	3	10	6	......	....
......	.950	.950	.950	N.NW	SW	S.SW	4	12	4	4.8	S. 54 W	10	10	6	......	.82
.882	.618	.761	.754	W.NW	NW	W.NW	4	4	2	3.2	N. 58 W	2	3	2	......	.94
.930	.475	.935	.780	N.NE	SE	S	2	2	2	0.9	S. 54 E	0	2	3	......	....
.932	.455	.899	.762	W.SW	S	SW	4	2	4	3.0	S. 46 W	0	2	6	......	....
.892	.621	.871	.795	......	......	......	....	....	....	3.0	S. 57 W	4.7	5.4	3.6	......	3.08
.945	1.000	.872	.939	W.SW	W	W.NW	25	25	12	20.0	S. 85 W	10	4	6	......	1.80
.777	.620	.926	.774	N.NW	N.NW.	NW	4	4	2	3.2	N. 27 W	8	3	2	......	1.28
.920	.642	.876	.813	W.NW	W	W. SW	2	2	2	1.8	West	2	0	0	......	....
.735	.537	.459	.577	S.SW	SW	S	2	2	2	1.9	S. 23 W	2	0	1	......	....
.799	.632	.900	.777	S.SE	SE	S	2	4	2	2.5	S. 29 E	0	1	2	......	....
.856	.741	.949	.849	S.SW	SW	S.SW	2	2	2	1.9	S. 31 W	4	8	5	......	....
.854	.863	.950	.889	SW	S.SW	S.SW	4	4	4	3.9	S. 30 W	3	4	10	......	.26
.950	1.000	.387	.779	SW	W. SW	W	12	4	4	6.3	S. 57 W	10	4	2	......	.08
.878	.532	.876	.762	W	W.NW	N.NW.	4	4	4	3.5	N. 61 W	3	4	2	......	....
1.000	.495	.424	.640	S.SW	S	S.SW	4	2	4	3.5	S. 18 W	0	5	1	......	....
.880	.529	.681	.697	W.SW	W	NW	2	2	4	2.5	S. 61 W	4	1	7	......	....
.900	.796	.861	.852	NE	E	SE	4	4	2	2.8	N. 80 E	8	3	4	......	....
.927	.747	.861	.845	N.NE	NE	NW	4	12	4	2.5	S. 74 E	4	5	7	......	.33
......	.658	.937	.797	W	SW	S.SW	4	4	2	2.9	S. 59 W	3	7	10	......	....
......	.804	.942	.873	SW	W. SW	W	2	4	4	3.2	S. 72 W	6	1	2	......	....
.937	.570	.927	.815	N.NE	N.NE	NE	2	2	2	1.9	N. 31 E	3	2	5	......	....
.936	.830	.850	.872	E.NE	E	E.SE	2	4	2	2.5	East	10	4	2	......	....
.764	.768	.947	.826	SW	E.SE	S	25	4	12	11.5	S. 25 W	8	5	3	......	....
.876	.825	.935	.879	SE	S	SW	4	4	2	2.8	S. 10 E	4	2	4	......	....
.874	.647	.886	.862	SW	SW	S.SW	4	4	4	3.9	S. 37 W	5	7	4	......	....
.935	.648	.942	.843	W	W. SW	W	41	12	12	9.0	S. 80 W	3	1	2	......	....
.937	.518	.941	.799	N	N.NW.	W.NW	4	12	4	6.3	N. 27 W	7	2	1	......	....
.884	.689	.944	.839	SW	SW	S.SW	2	4	2	2.6	S. 40 W	3	2	8	......	....
.936	.553	.925	.805	N.NE	W	S.SW	25	4	2	7.3	N. 13 E	10	7	2	......	.44
.847	.595	.641	.694	SE	S.SW	S.SW	2	4	2	2.3	S. 7 W	2	0	0	......	....
.777	.700	.874	.784	E.NE	S.SE	S.SW	4	2	2	1.4	S. 60 E	0	0	0	......	....
......	.524	.935	.725	SE	S	S.SW	4	2	2	2.3	S. 17 E	1	0	3	......	....
.929	.558	.888	.792	N.NW	SW	S	2	4	2	1.5	S. 50 W	4	3	8	......	....
1.000	.802	.937	.913	N	N.NE	E	4	12	4	5.8	N. 30 E	9	4	10	......	....
.933	.929	.926	.929	NW	N.NE	N	4	2	2	2.3	N. 17 W	6	8	10	......	.16
......	.691	.850	.807	......	......	......	....	....	....	1.8	S. 67 W	4.7	3.2	4.1	......	3.35

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Oct. 1	29.488	29.470	29.459	29.472	....	57	56	48	59	56	54.3	60	44	....	.439	.449	.444
2	29.453	29.381	29.436	29.423	59	69	68	61	70	68	66.3	73	54	.437	.695	.685	.606
3	29.488	29.413	29.371	29.424	67	71	65	67	73	66	68.7	75	64	.622	.731	.604	.652
4	29.231	29.170	29.412	29.271	69	69	53	70	71	58	66.3	77	57	.695	.682	.336	.571
5	29.723	29.717	29.706	29.715	48	50	44	50	60	45	51.7	60	44	.309	.229	.275	.271
6	29.570	29.321	29.151	29.347	39	60	59	40	66	66	57.3	68	35	.225	.438	.407	.357
7	29.241	29.225	29.185	29.217	68	72	69	70	76	72	72.7	76	35	.682	.731	.668	.695
8	29.263	29.202	29.150	29.188	69	74	68	73	77	74	74.7	80	71	.655	.799	.604	.686
9	29.427	29.507	29.530	29.488	53	58	55	56	60	55	57.	75	54	.420	.456	.433	.436
10	29.481	29.287	29.271	29.346	....	55	....	51	56	51	52.7	57	49	....	.420	....	.420
11	29.451	29.510	29.528	29.496	47	51	46	47	55	48	50.	56	45	.323	.321	.284	.309
12	29.548	29.462	29.426	29.479	47	52	44	48	58	45	50.3	60	38	.310	.309	.275	.298
13	29.398	29.322	29.320	29.347	48	45	54	48	58	55	53.7	59	42	.335	.129	.404	.289
14	29.370	29.364	29.478	29.404	54	60	47	55	65	48	56.	66	48	.404	.451	.310	.388
15	29.630	29.558	29.322	29.570	39	45	39	40	48	39	42.3	50	38	.225	.260	.238	.241
16	29.308	29.213	29.189	29.233	44	50	50	48	50	52	50.	53	34	.236	.361	.334	.310
17	29.368	29.478	29.556	29.467	47	46	47	48	52	49	49.7	54	45	.310	.232	.297	.280
18	29.712	29.547	29.481	29.580	34	55	50	39	60	51	50.	60	34	.131	.367	.348	.282
19	29.245	29.276	29.407	29.309	54	....	40	57	49	41	49.	58	34	.378	....	.235	.307
20	29.565	29.468	29.292	29.442	37	45	43	38	48	43	43.	49	37	.207	.260	.278	.248
21	29.144	28.917	28.902	28.954	49	48	50	50	49	51	50.	54	42	.335	.322	.348	.335
22	28.965	29.122	29.254	29.114	42	46	41	42	47	42	43.7	53	40	.267	.297	.244	.269
23	29.615	29.686	29.672	29.658	37	40	38	38	45	39	40.7	46	35	.207	.182	.216	.202
24	29.468	29.345	29.392	29.402	45	52	56	48	57	58	54.3	59	37	.260	.322	.422	.335
25	29.698	29.725	29.735	29.719	37	37	34	37	38	34	36.3	59	33	.220	.207	.196	.208
26	29.588	29.485	29.358	29.477	....	....	....	33	34	33	33.3	43	32	....	....	....	....
27	29.273	99.250	29.352	29.292	....	38	38	31	40	39	36.7	41	30	....	.203	.216	.200
28	29.465	29.411	29.390	29.422	40	44	....	42	47	40	43.	48	34	.221	.249	....	.335
29	29.436	29.448	29.556	29.477	44	46	43	45	48	45	46.	49	40	.275	.284	.251	.270
30	29.544	29.380	29.370	29.431	40	53	50	42	59	55	52.	60	32	.221	.323	.205	.280
31	29.425	29.304	29.277	29.335	51	56	53	53	65	60	59.3	65	52	.348	.330	.310	.329
Means....	29.434	29.353	29.391	29.393	....	....	....	48.8	56.1	50.9	51.9	....	....	....	....	....	....
Nov. 1	29.420	29.309	99.290	29.340	....	....	....	55	63	55	57.7	64	50	....	....	....	....
2	29.257	29.111	28.884	29.084	....	....	....	56	59	54	56.3	61	53	....	....	....	....
3	29.217	29.315	29.560	29.364	....	....	....	41	42	36	39.7	57	36	....	....	....	....
4	29.671	29.548	29.478	29.566	....	....	....	32	48	37	39.	50	26	....	....	....	....
5	29.294	29.186	29.3[illegible]3	29.368	....	....	....	46	53	39	46.	55	35	....	....	....	....
6	29.466	29.383	29.389	29.413	....	....	....	30	31	25	28.7	40	24	....	....	....	....
7	29.481	29.459	29.434	29.458	....	....	....	28	29	27	28.	30	23	....	....	....	....
8	29.404	29.423	29.489	29.439	....	....	....	27	31	25	27.7	32	24	....	....	....	....
9	29.523	29.470	29.535	29.509	....	....	....	35	40	38	37.7	40	21	....	....	....	....
10	29.612	29.551	29.560	29.574	....	....	....	43	47	36	42.	49	36	....	....	....	....
11	29.439	29.296	29.179	29.305	....	....	....	44	53	52	49.7	54	30	....	....	....	....
12	29.465	29.489	29.409	29.454	....	....	....	42	44	42	42.7	56	41	....	....	....	....
13	29.608	29.624	29.600	29.611	....	....	....	37	42	36	38.3	46	35	....	....	....	....
14	29.554	29.628	29.815	29.666	....	....	....	42	48	38	42.7	60	36	....	....	....	....
15	30.087	30.124	30.145	30.119	....	....	....	22	30	23	25.	38	22	....	....	....	....
16	30.031	29.884	29.825	29.913	....	....	....	28	46	38	37.3	46	21	....	....	....	....
17	29.682	29.646	29.749	29.692	....	....	....	47	49	44	46.7	49	38	....	....	....	....
18	29.772	29.636	29.494	29.634	....	....	....	39	45	46	43.3	46	38	....	....	....	....
19	29.266	29.169	28.990	29.142	....	....	....	49	48	44	47.	51	43	....	....	....	....
20	28.947	29.075	29.178	29.067	....	....	....	41	38	37	38.7	45	35	....	....	....	....
21	29.281	29.240	29.200	29.240	....	....	....	32	36	44	37.3	44	31	....	....	....	....
22	29.205	29.175	29.301	29.227	....	....	....	34	38	32	34.7	41	30	....	....	....	....
23	29.514	20.493	29.486	29.498	....	....	....	27	31	30	29.3	33	25	....	....	....	....
24	29.396	29.370	29.300	29.355	....	....	....	45	40	36	40.3	41	29	....	....	....	....
25	29.238	20.227	29.227	29.231	....	....	....	33	45	41	39.7	41	32	....	....	....	....
26	29.223	29.215	29.243	29.227	....	....	....	35	38	35	36.	41	33	....	....	....	....
27	29.238	29.121	29.026	29.128	....	....	....	33	32	30	31.7	39	28	....	....	....	....
28	28.916	28.920	29.023	28.953	....	....	....	34	36	35	35.	37	29	....	....	....	....
29	29.121	29.105	29.206	29.144	....	....	....	32	38	34	34.7	40	31	....	....	....	....
30	29.373	29.285	29.263	29.307	....	....	....	35	38	35	36.	39	33	....	....	....	....
Means....	29.423	29.392	29.387	29.401	....	....	....	37.5	41.9	37.5	38.9	....	....	....	....	....	....

of the north and northwestern lakes, at Buffalo, New York.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.			
											°						
......	.878	1.000	.939	NW	W	W	2	2	2	1.9	N. 75 W.	10	10	10	......	.50
.882	.948	1.000	.943	SW	S. SW.	S. SW.	4	4	2	3.2	S. 32 W.	10	6	8	......	.18
1.000	.902	.945	.949	S	S. SE	S. SW.	4	4	4	3.8	South	10	8	10	......	....
.948	.899	.698	.848	SW	W. SW	S	12	25	4	13.0	S. 55 W.	7	5	10	......	.10
.856	.442	.920	.739	SW	S	S	4	2	2	2.4	S. 23 W.	2	0	3	......	....
.910	.685	.636	.744	SW	W	NW	2	2	2	1.6	West	3	1	4	......	....
.899	.815	.852	.855	NW	N. NE.	N	4	4	12	6.2	N. 4 W.	6	2	10	......	....
.807	.862	.720	.796	NW	NW	W	4	4	4	3.7	N. 60 W.	8	3	5	......	....
.935	.880	1.000	.938	E. NE	SE	S. SE.	2	2	4	2.1	S. 48 E.	10	10	10	......	....
......	.935	......	.935	E	NE	N. NE.	2	4	4	3.0	N. 44 E.	10	10	10	......	.20
1.000	.743	.850	.864	N. NE.	N	N. NW	4	2	2	2.5	N. 5 E.	10	5	10	......	.14
.925	.641	.920	.829	N. NE.	E. NE	E. NE.	2	4	4	3.2	N. 60 E.	3	4	10	......	....
1.000	.267	.934	.734	E	E. NE	S. SE.	2	4	2	2.1	S. 87 E.	10	10	10	......	....
.934	.731	.925	.863	S. SE	S	E. NE.	4	12	12	5.6	S. 49 E.	7	10	10	......	....
.910	.777	1.000	.896	NE	N. NE.	E. NE.	12	4	4	6.5	N. 45 E.	10	10	10	......	....
.704	1.000	.861	.855	S. SE	SE	S	12	12	25	15.7	S. 17 E.	10	10	10	......	....
.925	.598	.853	.792	S. SW	SW	SW	4	4	4	3.9	S. 37 W.	10	7	4	......	.32
.547	.708	.929	.728	S. SE	S	SW	4	4	2	3.0	South	2	4	8	......	....
.812	......	.912	.862	N. NW.	W. NW	W. NW	25	25	12	19.2	N. 49 W.	10	4	10	......	....
.905	.777	1.000	.894	N. NE.	N. NW	W. NW	12	12	4	8.0	N. 9 W.	6	8	10	......	.04
.927	.926	.929	.927	S. SW.	SW	SW	25	25	25	24.7	S. 38 W.	10	10	10	......	....
1.000	.923	.914	.946	W. SW.	W. SW	SW	25	25	12	20.3	S. 63 W.	10	9	6	......	.66
.905	.607	.906	.806	W. NW	W	NW	12	4	4	6.5	N. 68 W.	10	6	7	......	....
.777	.692	.876	.782	S. SW	S. SE.	S	12	12	4	8.7	South	7	10	10	......	.06
1.000	.905	1.000	.968	W. NW	W	N. NW	4	12	4	2.9	N. 54 W.	8	10	10	......	.25
......	......	......	......	NE	N. NE.	N	4	2	2	2.5	N. 29 E.	10	10	10	......	.12
......	.820	.907	.864	N. NW.	W. NW	W	2	4	4	3.0	N. 69 W.	0	8	10	......	.18
.829	.772	......	.801	W. SW.	S	S. SE.	4	12	4	5.8	S. 7 W.	10	10	10	......	....
.920	.850	.840	.870	W. SW.	W. SW	S. SW.	4	4	4	3.7	S. 53 W.	10	10	7	......	.12
.829	.647	.681	.819	S. SW	S	S. SE.	2	2	2	1.9	South	3	0	0	......	....
.864	.535	.599	.666	SW	S	S. SW.	2	2	2	1.9	S. 23 W.	0	0	0	......	....
......	......	......	......	....	....	....	....	....	....	2.5	S. 55 W.	7.4	6.7	8.1	......	2.87
......	......	......	......	NW	W. SW	SW	12	4	4	5.2	N. 74 W.	10	6	3	......	....
......	......	......	......	W	W. by S	SW	2	4	4.5	16.7	S. 49 W.	0	4	10	......	....
......	......	......	......	S. SW	S. SW.	W	4	4	2	3.0	S. 34 W.	4	3	8	......	.30
......	......	......	......	W	S	S. SE.	3	2	2	1.3	S. 18 W.	8	10	4	......	....
......	......	......	......	W. NW.	W	NW	2	12	4	5.7	N. 78 W.	6	8	10	......	....
......	......	......	......	N	N. NW	N	4	4	4	3.8	N. 8 W.	10	8	0	......	.10
......	......	......	......	NE	NE	N. NE.	12	12	12	11.8	N. 37 E.	10	10	10	......	....
......	......	......	......	N. NE	NE	N	2	2	4	2.5	N. 17 E.	10	10	8	......	.08
......	......	......	......	NW	W. NW	W	2	2	4	2.5	N. 73 E.	4	0	7	......	....
......	......	......	......	N	W. SW	SW	4	4	2	1.7	N. 77 W.	3	5	6	......	....
......	......	......	......	W. NW	W. SW	W	2	4	4	3.2	S. 86 W.	5	10	3	......	....
......	......	......	......	SW	S. SW.	SW	4	2	2	2.6	S. 40 W.	8	10	10	......	.04
......	......	......	......	S	S. SW.	S. SW.	2	2	2	1.9	S. 16 W.	10	8	10	......	....
......	......	......	......	SW	W. SW	SW	2	4	2	2.6	S. 56 W.	6	4	2	......	....
......	......	......	......	W	E. NE.	E. NE.	4	12	4	4.1	N. 60 E.	3	10	0	......	....
......	......	......	......	E. SE	SE	W	2	2	2	0.8	S. 29 E.	10	10	9	......	....
......	......	......	......	S	S	N. NE.	4	4	2	2.1	S. 7 E.	10	10	10	......	.08
......	......	......	......	E	E. SE	S	4	4	2	2.8	S. 65 E.	10	10	10	......	.12
......	......	......	......	NW	N	N	2	4	2	2.5	N. 11 W.	10	10	10	......	.46
......	......	......	......	NE	N	N	4	4	4	3.7	N. 15 E.	10	10	10	......	1.44
......	......	......	......	N	N. NW	W. by S	4	4	2	2.7	N. 26 W.	10	10	10	......	....
......	......	......	......	S	S	N. by E	2	2	12	2.7	N. 17 E.	10	10	10	......	....
......	......	......	......	NWbyW	W. NW	W	4	12	12	9.0	N. 76 W.	10	10	4	......	.02
......	......	......	......	S. SW	S. SW.	S. by W	25	25	12	20.6	S. 20 W.	10	6	2	......	....
......	......	......	......	S	S	S	2	4	2	2.7	South	8	10	10	......	....
......	......	......	......	NW	NW	W	2	4	4	3.1	N. 63 W.	10	10	7	......	.08
......	......	......	......	W	SW	SE	4	12	2	5.0	S. 48 W.	10	10	10	......	0
......	......	......	......	S. by E.	S. SW.	S. SW.	12	25	12	16.6	S. 14 W.	10	6	10	......	.04
......	......	......	......	S. SE	SW	E. by S	2	2	2	1.3	S. 21 E.	10	10	10	......	....
......	......	......	......	S	S. SE.	E. NE.	4	2	2	1.9	S. 28 E.	10	10	10	......	.02
......	......	......	......	....	....	....	....	....	....	1.9	S. 56 W.	....	....	....	......	....

N.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29. 295	29. 443	29. 470	29. 403	....	....	....	38	39	36	37. 7	40	35	....	....	....	....
2	29. 641	29. 666	29. 579	29. 629	....	....	....	28	30	29	29	38	26	....	....	....	....
3	29. 379	29. 258	29. 327	29. 321	....	....	....	29	33	26	29. 3	38	25	....	....	....	....
4	29. 396	29. 315	29. 228	29. 313	....	....	....	30	34	33	32. 3	35	25	....	....	....	....
5	29. 241	29. 086	28. 994	29. 107	....	....	....	28	34	27	29. 7	35	26	....	....	....	....
6	28. 987	29. 138	29. 286	29. 137	....	....	....	18	14	11	14. 3	30	10	....	....	....	....
7	29. 501	29. 485	29. 533	29. 506	....	....	....	13	19	16	16	21	6	....	....	....	....
8	29. 633	29. 509	29. 490	29. 544	....	....	....	16	25	21	20. 7	27	6	....	....	....	....
9	29. 607	29. 571	29. 518	29. 565	....	....	....	22	32	33	29	33	15	....	....	....	....
10	29. 515	29. 465	29. 423	29. 468	....	....	....	34	38	38	36. 7	39	28	....	....	....	....
11	29. 397	29. 351	29. 332	29. 360	....	....	....	41	47	43	43. 7	47	35	....	....	....	....
12	29. 477	29. 515	29. 504	29. 499	....	....	....	41	46	42	43	46	40	....	....	....	....
13	29. 487	29. 405	29. 387	29. 426	....	....	....	41	46	49	45. 3	50	39	....	....	....	....
14	29. 352	29. 343	29. 273	29. 323	....	....	....	51	50	54	51. 7	55	47	....	....	....	....
15	29. 109	29. 009	28. 910	29. 009	....	....	....	55	56	44	51. 7	56	44	....	....	....	....
16	28. 886	29. 013	29. 147	29. 015	....	....	....	34	35	31	33. 3	45	30	....	....	....	....
17	29. 505	29. 709	29. 887	29. 700	....	....	....	23	25	22	23. 3	33	19	....	....	....	....
18	29. 958	29. 699	29. 456	29. 704	....	....	....	14	29	30	24. 3	31	13	....	....	....	....
19	29. 400	29. 730	29. 888	29. 673	....	....	....	36	21	14	23. 7	37	13	....	....	....	....
20	30. 101	30. 117	30. 058	30. 092	....	....	....	6	11	7	8	27	5	....	....	....	....
21	29. 891	29. 667	29. 551	29. 703	....	....	....	6	26	28	20	29	3	....	....	....	....
22	29. 551	29. 412	29. 360	29. 441	....	....	....	32	39	40	37	41	28	....	....	....	....
23	29. 523	29. 593	29. 678	29. 599	....	....	....	35	38	33	35. 3	41	32	....	....	....	....
24	29. 609	29. 487	29. 432	29. 509	....	....	....	29	41	43	37. 7	44	28	....	....	....	....
25	29. 371	29. 274	29. 255	29. 300	....	....	....	47	46	42	44. 3	49	40	....	....	....	....
26	29. 150	28. 950	28. 905	29. 002	....	....	....	40	44	46	43. 3	47	39	....	....	....	....
27	29. 180	29. 235	29. 233	29. 216	....	....	....	36	38	35	36. 3	47	34	....	....	....	....
28	29. 255	29. 243	29. 210	29. 236	....	....	....	34	39	36	36. 3	40	34	....	....	....	....
29	29. 255	29. 317	29. 370	29. 314	....	....	....	42	41	36	39. 7	43	35	....	....	....	....
30	29. 426	29. 339	29. 301	29. 355	....	....	....	30	29	28	29	38	27	....	....	....	....
31	29. 552	29. 607	29. 710	29. 623	....	....	....	24	26	21	23. 7	37	19	....	....	....	....
Means....	29. 439	29. 418	29. 409	29. 422	....	....	....	30. 8	34. 5	32. 1	32. 8	....	....	....	....	....	....
1863.																	
Jan. 1	29. 777	29. 688	29. 611	29. 692	....	....	....	26	33	28	29	33	19	....	....	....	....
2	29. 523	29. 436	29. 336	29. 432	....	....	....	35	45	45	41. 7	46	25	....	....	....	....
3	29. 419	29. 320	29. 204	29. 314	....	....	....	44	55	46	48. 3	55	42	....	....	....	....
4	28. 881	28. 654	29. 050	28. 862	....	....	....	47	54	40	47	55	39	....	....	....	....
5	29. 113	29. 097	28. 997	29. 069	....	....	....	39	44	44	42. 3	45	26	....	....	....	....
6	28. 970	28. 935	29. 051	28. 975	....	....	....	36	38	28	34	45	28	....	....	....	....
7	29. 435	29. 547	29. 630	29. 537	....	....	....	19	22	21	20. 7	24	16	....	....	....	....
8	29. 735	29. 661	29. 667	29. 688	....	....	....	23	28	26	25. 7	29	18	....	....	....	....
9	29. 757	29. 685	29. 599	29. 680	....	....	....	26	34	29	29. 7	35	24	....	....	....	....
10	29. 200	28. 945	28. 968	29. 038	....	....	....	36	38	37	37	40	27	....	....	....	....
11	29. 061	29. 088	29. 296	29. 148	....	....	....	32	33	30	51. 7	38	28	....	....	....	....
12	29. 552	29. 418	29. 534	29. 501	....	....	....	24	37	27	29. 3	40	23	....	....	....	....
13	29. 757	29. 588	29. 350	29. 565	....	....	....	26	33	36	31. 7	38	22	....	....	....	....
14	29. 176	28. 915	29. 033	29. 041	....	....	....	46	46	39	42. 7	47	36	....	....	....	....
15	29. 146	28. 996	28. 881	29. 008	....	....	....	30	30	28	29. 3	41	27	....	....	....	....
16	28. 760	28. 784	29. 164	28. 869	....	....	....	17	14	8	13	29	7	....	....	....	....
17	29. 715	29. 864	29. 949	29. 843	....	....	....	4	12	10	8. 7	24	3	....	....	....	....
18	30. 117	30. 037	29. 876	30. 010	....	....	....	7	22	11	13. 3	23	6	....	....	....	....
19	29. 956	29. 835	29. 762	29. 851	....	....	....	11	34	24	23	36	6	....	....	....	....
20	29. 719	29. 611	29. 581	29. 637	....	....	....	25	32	32	29. 7	30	18	....	....	....	....
21	29. 554	29. 565	29. 621	29. 580	....	....	....	27	34	32	31	37	25	....	....	....	....
22	29. 611	29. 510	29. 460	29. 527	....	....	....	32	40	36	36	42	29	....	....	....	....
23	29. 565	29. 570	29. 613	29. 583	....	....	....	34	40	35	36. 3	41	33	....	....	....	....
24	29. 530	29. 492	29. 495	29. 506	....	....	....	36	43	42	40. 3	44	33	....	....	....	....
25	29. 670	29. 643	29. 633	29. 649	....	....	....	36	39	35	36. 7	43	34	....	....	....	....
26	29. 511	29. 315	29. 215	29. 347	....	....	....	32	38	34	34. 7	39	30	....	....	....	....
27	29. 158	29. 201	29. 286	29. 215	....	....	....	33	32	30	51. 7	36	29	....	....	....	....
28	29. 381	29. 329	29. 247	29. 317	....	....	....	28	29	26	27. 7	32	25	....	....	....	....
29	29. 102	29. 034	29. 048	29. 061	....	....	....	24	27	33	28	34	23	....	....	....	....
30	29. 091	29. 148	29. 258	29. 166	....	....	....	32	33	33	32. 7	35	21	....	....	....	....
31	29. 381	29. 221	29. 361	29. 321	....	....	....	32	32	32	32	35	28	....	....	....	....
Means....	29. 420	29. 334	29. 319	29. 361	....	....	....	28. 9	34. 5	30. 8	31. 4	....	....	....	....	....	....

of the north and northwestern lakes, at Buffalo, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
......	......	......	......	W. by N.	W	W	4	4	12	6.6	N. 88 W.	10	10	10	......	.06
......	......	......	......	W.NW	NW ..	E. SE	12	4	2	4.6	N. 61 W.	10	10	10	......	....
......	......	......	......	E.SE ..	S.SE..	W	4	12	2	4.7	S. 27 E.	10	10	0	......	....
......	......	......	......	S.......	SW...	S	2	12	4	5.6	S. 30 W.	10	10	10	......	....
......	......	......	......	W.NW	W	NW...	2	4	2	2.5	N. 73 W.	10	10	10	......	.18
......	......	......	......	W.NW	NW ..	NW ..	12	35	12	19.3	N. 50 W.	2	10	10	......	....
......	......	......	......	NW ...	NW ..	N	25	25	12	19.7	N. 37 W.	10	10	10	......	....
......	......	......	......	SE.....	SE....	E	2	12	2	5.2	S. 50 E.	10	10	10	......	....
......	......	......	......	E	W.NW	W.SW	2	12	25	11.0	S. 81 W.	10	10	10	......	.08
......	......	......	......	SW ..	S.SW.	S.SW.	25	12	4	13.5	S. 36 W.	10	10	1	......	....
......	......	......	......	S	S	S	12	12	12	12.0	South ...	3	10	0	......	....
......	......	......	......	W. SW.	SE....	NE....	2	2	2	0.4	S. 51 E.	10	10	10	......	....
......	......	......	......	SE.....	S	S	2	25	12	12.8	S. 2 E.	10	10	10	......	....
......	......	......	......	S	S	S	4	12	12	9.3	South ...	10	10	10	......	.30
......	......	......	......	S	S	N	12	12	4	6.7	South ...	10	10	10	......	.18
......	......	......	......	N	W	W	25	35	25	21.7	N. 67 W.	10	10	10	......	1.38
......	......	......	......	N	N.....	N	4	12	4	6.7	North ...	10	10	10	......	....
......	......	......	......	E.NE ..	S	S	2	25	45	23.3	S. 1 E.	2	10	0	......	.02
......	......	......	......	W	N.NW.	NW ..	25	35	25	25.0	N. 48 W.	10	6	3	......	....
......	......	......	......	N	N.NE.	E	4	4	2	2.8	N. 25 E.	7	10	0	......	....
......	......	......	......	E	S. by E.	S.SW.	2	4	4	2.5	S. 10 E.	10	10	10	......	....
......	......	......	......	W	S	SW...	2	12	4	5.2	S. 18 W.	10	10	10	......	.02
......	......	......	......	NW ...	NE ...	NE....	2	2	2	1.5	N. 19 E.	10	10	10	......	....
......	......	......	......	E. NE..	E.NE.	S	4	2	4	1.9	S. 73 E.	10	10	2	......	....
......	......	......	......	S.......	W.SW	S	12	12	2	7.2	S. 32 W.	10	10	10	......	....
......	......	......	......	E	E	SW...	4	4	4	2.0	S. 62 E.	10	10	10	......	.32
......	......	......	......	W. SW.	W.SW	S.SW.	4	12	2	5.8	S. 63 W.	10	10	10	......	.62
......	......	......	......	S	W.SW	W.SW	4	25	4	10.2	S. 60 W.	10	8	10	......	....
......	......	......	......	W. SW.	W.SW	N. by E	12	12	2	7.7	S. 72 W.	10	10	10	......	....
......	......	......	......	NE	NE ...	NE....	12	12	4	9.3	N. 45 E.	10	10	10	......	....
......	......	......	......	E.NE ..	NE ...	SE....	12	2	2	4.8	N. 71 E.	10	6	0	......	....
......	......	......	......	....	....	....	....	....	....	3.5	S. 69 W.	....	....	....	......	....
......	......	......	......	S	SW...	S.SW.	12	12	12	11.5	S. 22 W.	7	7	2	......	....
......	......	......	......	S	S	SW...	2	2	2	1.8	S. 15 W.	10	10	7	......	....
......	......	......	......	S.......	SW ..	W.SW	2	4	2	2.4	S. 39 W.	10	8	10	......	....
......	......	......	......	S.SE...	S.SE..	W.SW	12	12	45	17.2	S. 39 W.	10	10	1	......	....
......	......	......	......	SW	W.SW	S	12	25	25	18.0	S. 36 W.	0	8	10	......	.06
......	......	......	......	NW ...	NW ..	NW ..	12	2	25	9.7	N. 45 W.	10	10	10	......	.14
......	......	......	......	NW ...	NW ..	W.SW	25	12	2	12.7	N. 48 W.	10	10	10	......	....
......	......	......	......	E	SE....	SE....	2	12	4	5.8	S. 49 E.	10	10	10	......	.02
......	......	......	......	SE.....	SE....	SE....	2	4	2	2.7	S. 45 E.	10	10	0	......	....
......	......	......	......	SE.....	SE....	SW ..	35	45	35	29.3	S. 21 E.	10	10	10	......	....
......	......	......	......	W.NW.	W.NW	NW ..	4	4	4	3.9	N. 60 W.	10	10	10	......	.18
......	......	......	......	E. SE ..	S	N.....	2	2	2	0.7	S. 67 E.	10	10	0	......	....
......	......	......	......	E.NE ..	E	SE....	4	4	2	3.0	East	10	10	10	......	....
......	......	......	......	S. by E.	S	W.NW	12	12	12	7.2	S. 23 W.	10	10	10	......	.26
......	......	......	......	NE	NE....	E.NE.	4	12	12	9.2	N. 56 E.	10	10	10	......	.44
......	......	......	......	NW ...	NW ..	W.SW	4	12	12	7.7	N. 73 W.	10	10	10	......	.64
......	......	......	......	NW ...	E.NE.	E.NE.	2	2	2	1.2	N. 73 E.	10	10	0	......	.02
......	......	......	......	SE......	SE....	SE....	2	2	2	2.0	S. 45 E.	0	7	0	......	....
......	......	......	......	E.NE ..	SE....	E	2	2	2	1.7	S. 83 E.	8	10	0	......	....
......	......	......	......	E.NE ..	E.NE	SE....	2	4	4	2.7	S. 86 E.	10	10	10	......	....
......	......	......	......	NE.....	NE....	E.NE..	4	4	4	3.9	N. 53 E.	10	10	7	......	.04
......	......	......	......	E.NE ..	W.SW	W.SW	2	4	4	2.0	S. 68 W.	10	10	10	......	....
......	......	......	......	W	W	E	2	2	2	0.7	West....	10	10	10	......	....
......	......	......	......	SE......	SE....	S	4	4	12	6.2	S. 18 E.	9	10	10	......	....
......	......	......	......	W. SW.	W.SW	S.SW.	2	12	2	5.2	S. 62 W.	10	1	6	......	....
......	......	......	......	E	E.NE	N.....	2	2	2	1.6	N. 54 E.	10	10	10	......	....
......	......	......	......	NE......	NE....	NE....	12	12	2	8.7	N. 45 E.	10	10	10	......	.54
......	......	......	......	NE......	NE....	NE....	4	4	4	4.0	N. 54 E.	10	10	10	......	....
......	......	......	......	W	W. by S	S.SW.	2	12	4	5.4	S. 68 W.	10	10	10	......	....
......	......	......	......	S	W.SW	W	2	12	12	8.2	S. 75 W.	10	10	10	......	.02
......	......	......	......	W. SW.	W.SW	NW ..	35	45	4	27.2	S. 70 W.	10	10	10	......	.02
......	......	......	......	....	....	....	....	....	....	2.8	S. 39 W.	9.1	9.4	7.5	......	2.38

N.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	29.297	28.977	28.915	29.063	....	....	....	22	41	38	33.7	41	22	....	....	....	....
2	29.398	29.413	29.441	29.417	....	....	....	18	20	17	18.3	31	16	....	....	....	....
3	29.536	29.576	29.790	29.632	....	....	....	11	15	6	10.7	22	4	....	....	....	....
4	30.122	30.146	30.084	30.117	....	....	....	6	4	1	0.3	15	8	....	....	....	....
5	29.804	29.642	29.512	29.653	....	....	....	16	24	24	21.3	25	1	....	....	....	....
6	29.204	29.233	29.411	29.283	....	....	....	27	31	28	28.7	34	22	....	....	....	....
7	29.614	29.593	29.606	29.614	....	....	....	27	35	30	30.7	36	24	....	....	....	....
8	29.772	29.780	29.743	29.765	....	....	....	24	36	31	30.3	37	21	....	....	....	....
9	29.741	29.478	29.195	29.471	....	....	....	28	33	42	34.3	42	26	....	....	....	....
10	29.478	29.563	29.739	29.593	....	....	....	33	31	29	31	43	27	....	....	....	....
11	29.719	29.533	29.413	29.555	....	....	....	25	35	31	30.3	36	23	....	....	....	....
12	29.326	29.264	29.397	29.327	....	....	....	30	27	26	27.7	36	24	....	....	....	....
13	29.688	29.725	29.830	29.748	....	....	....	18	23	6	15.7	29	16	....	....	....	....
14	29.764	29.472	29.283	29.506	....	....	....	8	39	35	27.3	42	2	....	....	....	....
15	29.375	29.405	29.538	29.439	....	....	....	34	34	33	33.7	42	31	....	....	....	....
16	29.785	29.829	29.768	29.794	....	....	....	34	29	33	32	34	21	....	....	....	....
17	29.705	29.578	29.531	29.605	....	....	....	23	37	28	29.3	37	16	....	....	....	....
18	29.489	29.356	29.302	29.382	....	....	....	25	45	39	36.3	46	21	....	....	....	....
19	29.234	29.052	28.827	29.038	....	....	....	27	24	41	30.7	47	36	....	....	....	....
20	28.956	29.160	29.449	29.188	....	....	....	34	36	25	31.7	42	18	....	....	....	....
21	29.701	29.837	29.889	29.809	....	....	....	13	16	10	13	27	9	....	....	....	....
22	29.614	29.594	29.651	29.620	....	....	....	8	12	13	11	20	7	....	....	....	....
23	29.810	29.787	29.693	29.763	....	....	....	2	22	16	13.3	24	0	....	....	....	....
24	29.582	29.556	29.589	29.576	....	....	....	24	30	29	27.7	32	8	....	....	....	....
25	29.623	29.582	29.614	29.606	....	....	....	20	39	31	30	40	18	....	....	....	....
26	29.295	29.097	29.009	29.134	....	....	....	38	45	48	43.7	49	28	....	....	....	....
27	29.183	29.310	29.551	29.348	....	....	....	35	36	32	34.3	49	31	....	....	....	....
28	29.647	29.553	29.361	29.520	....	....	....	26	39	32	32.3	40	24	....	....	....	....
Means....	29.553	29.503	29.504	29.520	....	....	....	22.2	37.7	27.0	25.6	....	....	....	....	....	....
March 1	28.936	28.926	29.201	29.021	....	....	....	34	34	32	33.3	35	28	....	....	....	....
2	29.285	29.244	29.221	29.250	....	....	....	34	42	32	39.3	42	30	....	....	....	....
3	29.201	29.267	29.320	29.263	....	....	....	28	26	21	25	33	19	....	....	....	....
4	29.602	29.683	29.744	29.676	....	....	....	9	16	8	11	27	6	....	....	....	....
5	29.871	29.691	29.379	29.647	....	....	....	2	28	29	18.3	31	4	....	....	....	....
6	29.230	29.220	29.391	29.280	....	....	....	36	40	32	36	40	28	....	....	....	....
7	29.309	29.304	29.335	29.316	....	....	....	25	27	23	25	34	21	....	....	....	....
8	29.184	29.161	29.093	29.146	....	....	....	23	32	31	28.7	36	23	....	....	....	....
9	29.361	29.361	29.444	29.389	....	....	....	28	28	27	27.7	33	25	....	....	....	....
10	29.478	29.430	29.249	29.385	....	....	....	18	36	29	27.7	38	16	....	....	....	....
11	29.191	29.183	29.357	29.244	....	....	....	28	31	22	27	37	21	....	....	....	....
12	29.410	29.430	29.511	29.450	....	....	....	17	21	17	18.3	24	15	....	....	....	....
13	29.526	29.452	29.493	29.490	....	....	....	15	24	16	18.3	26	10	....	....	....	....
14	29.410	29.294	29.299	29.334	....	....	....	17	27	25	23	29	13	....	....	....	....
15	29.472	29.365	29.388	29.408	....	....	....	9	23	14	15.3	27	7	....	....	....	....
16	29.463	29.528	29.547	29.513	....	....	....	16	33	26	28.3	34	11	....	....	....	....
17	29.464	29.282	29.430	29.392	....	....	....	27	43	36	35.3	44	21	....	....	....	....
18	29.607	29.675	29.763	29.682	....	....	....	26	58	20	34.7	38	18	....	....	....	....
19	29.869	29.859	29.845	29.858	....	....	....	14	29	23	22	31	12	....	....	....	....
20	29.868	29.849	29.837	29.851	....	....	....	18	29	22	23	30	16	....	....	....	....
21	29.649	29.513	29.500	29.554	....	....	....	29	35	36	33	36	19	....	....	....	....
22	29.553	29.532	29.508	29.531	....	....	....	35	43	37	38.3	43	24	....	....	....	....
23	29.488	29.430	29.370	29.429	....	....	....	37	40	40	39	42	34	....	....	....	....
24	29.244	29.059	29.037	29.113	....	....	....	42	48	49	46.3	50	39	....	....	....	....
25	28.870	28.963	29.037	28.957	....	....	....	40	35	34	36.3	51	33	....	....	....	....
26	29.128	29.221	29.353	29.234	....	....	....	33	32	31	32	36	30	....	....	....	....
27	29.516	29.515	29.443	29.491	....	....	....	30	38	31	33	39	26	....	....	....	....
28	29.209	29.130	29.013	29.117	....	....	....	29	40	35	34.7	42	27	....	....	....	....
29	29.250	29.299	29.526	29.358	....	....	....	21	29	30	26.7	37	18	....	....	....	....
30	29.697	29.665	29.504	29.622	....	....	....	22	34	27	27.7	39	18	....	....	....	....
31	29.191	29.025	29.023	29.080	....	....	....	29	42	35	35.5	43	24	....	....	....	....
Means....	29.405	29.373	29.334	29.371	....	....	....	24.7	33.6	28.0	28.8	....	....	....	....	....	....

survey of the north and northwestern lakes, at Buffalo, New York.

VAPOR.				WIND.								Amount of cloudiness. (0=clear sky.) (10=sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
......	......	......	......	E. by S.	S	NE ...	2	12	45	13.0	N. 60 E..	0	10	7	......	....
......	......	......	......	W.NW.	W.byN	NW ...	25	12	12	16.0	N. 65 W.	7	10	10	......	.12
......	......	......	......	NW....	W.NW	W.SW	4	12	4	6.2	N. 71 W.	10	8	10	......	....
......	......	......	......	NE	E. NE.	E	2	2	12	5.1	N. 82 E..	10	8	10	......	.02
......	......	......	......	SE	NW...	NE ...	4	4	12	4.0	N. 45 E..	10	10	10	......	....
......	......	......	......	E	SE....	SW ...	2	2	12	5.7	S. 7 E ...	10	10	10	......	1.14
......	......	......	......	SW	S	SW ...	25	4	12	10.0	S. 40 W.	10	8	0	......	.14
......	......	......	......	SE.....	SW ...	NE ...	2	2	2	0.7	S. 45 E..	10	10	10	......	....
......	......	......	......	E. NE..	E. NE	S	4	4	25	7.8	S. 19 E..	10	10	10	......	.02
......	......	......	......	W.NW.	W. SW	W	4	12	2	8.1	West....	10	10	10	......	.34
......	......	......	......	E. NE..	E. NE.	NE ...	2	2	2	1.9	N. 59 E..	10	10	10	......	....
......	......	......	......	NE	NE ...	N.NW.	4	12	2	5.6	N. 39 E..	10	10	10	......	.02
......	......	......	......	NW....	NE ...	E	4	2	2	1.3	N. 9 E ..	10	10	10	......	.22
......	......	......	......	E	E. SE	S	2	2	4	2.0	S. 38 E..	1	0	10	......	....
......	......	......	......	SW	SW ...	SW ...	25	45	12	27.3	S. 45 W.	3	8	0	......	.06
......	......	......	......	W. by N	N. NW	SE....	4	4	2	1.0	N. 8 W..	7	10	0	......	....
......	......	......	......	E. NE..	NE ...	N	2	2	2	1.7	N. 37 E..	10	0	0	......	....
......	......	......	......	NE	SE....	SE....	2	2	2	1.5	S. 71 E..	10	10	10	......	....
......	......	......	......	E	W.NW	N. by E	2	2	2	0.9	N. 13 E..	10	10	10	......	.04
......	......	......	......	NW....	NW ...	W. SW	4	25	12	11.8	N. 64 W.	10	10	10	......	.10
......	......	......	......	N. NW.	N. NW	NE ...	12	4	4	6.0	N. 11 W.	1	2	0	......	....
......	......	......	......	E. NE..	E. NE.	E. NE.	12	12	12	12.0	N. 68 W.	10	10	10	......	....
......	......	......	......	E. NE..	E. NE.	E. NE.	2	2	12	2.0	N. 67 E..	0	0	0	......	.12
......	......	......	......	S. SW.	S. SW.	W. SW	4	4	12	6.3	S. 49 W.	8	10	10	......	....
......	......	......	......	S. SE..	W	E. NE	2	4	2	0.5	S. 54 W.	6	10	7	......	....
......	......	......	......	E. SE ..	S. SW.	S	2	4	12	5.5	S. 1 E...	10	10	10	......	....
......	......	......	......	SW	SW ...	NW ...	12	25	4	12.5	S. 52 W.	10	10	9	......	....
......	......	......	......	E. NE..	NE ...	E. NE	2	4	4	3.2	N. 58 E..	0	10	7	......	....
......	......	......	......	....	....	....	....	....	....	1.3	S. 69 W.	7.6	8.7	7.5	......	2.32
......	......	......	......	E. NE..	E. NE	S. SW.	4	12	2	4.9	N. 73 E..	10	10	10	......	....
......	......	......	......	SW	W. SW	E	4	2	2	1.5	S. 36 W.	10	10	10	......	.58
......	......	......	......	E. NE..	NE ...	NW ...	4	12	12	6.5	N. 11 E..	10	10	10	......	.02
......	......	......	......	N. NW.	NW ...	E. NE.	4	4	2	2.6	N. 18 W.	0	1	7	......	.04
......	......	......	......	E. NE..	S. SW.	S	2	4	4	2.3	S. 3 E ...	5	10	10	......	....
......	......	......	......	SW	SW ...	NW ...	25	25	2	16.7	S. 47 W.	10	2	10	......	.04
......	......	......	......	NE.....	NE ...	NE ...	12	12	4	9.3	N. 45 E..	10	10	10	......	.02
......	......	......	......	E. NE..	SW ...	SW ...	2	2	4	1.4	S. 35 W.	10	10	10	......	.34
......	......	......	......	SW. by W	W. SW	W. SW	35	45	45	41.3	S. 65 W.	6	10	4	......	.08
......	......	......	......	E. NE..	SW ...	W. SW	2	4	2	1.3	S. 45 W.	8	4	0	......	....
......	......	......	......	SW	NW ...	N. by E	2	4	4	2.1	N. 33 W.	0	10	0	......	....
......	......	......	......	N. NW.	N. NW.	NW ...	2	12	4	5.9	N. 28 W.	10	10	0	......	.04
......	......	......	......	W. SW.	W. SW	W. NW	4	12	4	6.3	S. 76 W.	10	10	0	......	.02
......	......	......	......	S. SW..	W. SW	SW ...	2	12	4	5.8	S. 58 W.	10	10	2	......	....
......	......	......	......	E. NE..	E. NE.	E. NE.	12	12	12	12.0	N. 67 E..	10	10	5	......	....
......	......	......	......	NE.....	SW ...	SW ...	2	4	2	1.3	S. 45 W.	10	7	0	......	....
......	......	......	......	S. by E.	W. SW	NE ...	2	4	2	0.9	S. 42 W.	10	10	10	......	.04
......	......	......	......	NE. by E	NE ...	E	4	4	2	3.2	N. 58 E..	10	8	0	......	....
......	......	......	......	E. by N.	SE....	E. NE.	2	2	4	2.3	N. 86 E..	1	0	0	......	....
......	......	......	......	E	E	E	4	25	4	11.0	East	10	10	2	......	....
......	......	......	......	SE.....	S	S	12	2	4	5.6	S. 30 E..	10	10	10	......	.34
......	......	......	......	SE	NE ...	NE ...	2	2	2	1.5	N. 72 E..	10	10	0	......	....
......	......	......	......	E. NE..	E	NW ...	12	4	2	5.0	N. 66 E..	10	10	10	......	.10
......	......	......	......	SE.....	SE....	S	4	25	25	16.7	S. 24 E..	10	10	10	......	.16
......	......	......	......	NE	SW ...	W. SW	2	25	12	11.5	S. 53 W.	10	10	10	......	.18
......	......	......	......	W	SW ...	W. SW	2	25	12	12.7	S. 54 W.	10	10	10	......	.02
......	......	......	......	W	SW ...	NE ...	2	12	2	3.8	S. 52 W.	10	5	7	......	....
......	......	......	......	E	S	W. SW	2	2	4	1.3	S. 26 W.	10	10	10	......	....
......	......	......	......	W. by S.	W	NW ...	25	12	4	13.2	S. 87 W.	10	10	10	......	.18
......	......	......	......	NW....	W. SW	SE....	2	4	2	1.3	S. 67 W.	0	1	1	......	.02
......	......	......	......	E	NW ...	W. SW	2	4	2	1.1	N. 52 W.	10	3	10	......	....
......	......	......	......	....	....	....	....	....	....	2.2	S. 48 W.	8.3	8.1	6.0	......	2.22

N.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	29. 328	29. 204	29. 019	29. 184	....	....	....	14	27	29	23. 3	36	12	....	....	....	....
2	28. 536	28. 660	28. 980	28. 725	....	....	....	42	44	36	40. 7	44	28	....	....	....	....
3	29. 261	29. 468	29. 633	29. 454	....	....	....	32	37	31	33. 3	37	30	....	....	....	....
4	29. 767	29. 703	29. 569	29. 680	....	....	....	26	35	29	30. 0	37	24	....	....	....	....
5	29. 368	29. 254	29. 203	29. 275	....	....	....	33	42	35	36. 7	38	29	....	....	....	....
6	29. 150	29. 193	29. 255	29. 199	....	....	....	36	39	34	36. 3	40	32	....	....	....	....
7	29. 399	29. 541	29. 636	29. 522	....	....	....	29	32	30	30. 3	35	28	....	....	....	....
8	29. 666	29. 640	29. 628	29. 645	....	....	....	30	36	33	33	36	27	....	....	....	....
9	29. 673	29. 702	29. 621	29. 665	....	....	....	31	39	32	34	41	28	....	....	....	....
10	29. 543	29. 310	29. 268	29. 374	....	....	....	31	55	48	44. 7	59	27	....	....	....	....
11	29. 237	29. 196	29. 062	29. 165	....	....	....	56	64	51	57	67	47	....	....	....	....
12	29. 282	29. 374	29. 482	29. 379	....	....	....	39	42	39	40	65	38	....	....	....	....
13	29. 525	29. 574	29. 553	29. 551	....	....	....	31	46	35	37. 3	49	30	....	....	....	....
14	29. 543	29. 522	29. 459	29. 501	....	....	....	29	58	44	43. 7	60	25	....	....	....	....
15	29. 432	29. 410	29. 396	29. 413	....	....	....	43	55	45	47. 7	60	38	....	....	....	....
16	29. 354	29. 336	29. 322	29. 337	....	....	....	42	45	43	43. 3	46	39	....	....	....	....
17	29. 334	29. 359	29. 407	29. 367	....	....	....	42	44	41	42. 3	45	40	....	....	....	....
18	29. 464	29. 453	29. 411	29. 443	....	....	....	42	50	47	46. 3	53	38	....	....	....	....
19	29. 406	29. 356	29. 371	29. 378	....	....	....	49	64	51	54. 7	66	38	....	....	....	....
20	29. 416	29. 556	29. 622	29. 531	....	....	....	49	49	53	50. 3	52	42	....	....	....	....
21	29. 711	29. 694	29. 658	29. 688	....	....	....	43	61	48	50. 7	65	41	....	....	....	....
22	29. 639	29. 498	29. 448	29. 528	....	....	....	44	67	52	54. 3	69	40	....	....	....	....
23	29. 384	29. 286	29. 233	29. 368	....	....	....	46	68	54	56	69	41	....	....	....	....
24	29. 195	29. 165	24. 197	29. 186	....	....	....	46	57	49	50. 7	63	45	....	....	....	....
25	29. 355	29. 445	29. 437	29. 412	....	....	....	34	48	41	41	60	33	....	....	....	....
26	29. 550	29. 580	29. 500	29. 543	....	....	....	40	50	40	43. 3	53	33	....	....	....	....
27	29. 512	29. 492	29. 334	29. 446	....	....	....	39	57	46	47. 3	58	34	....	....	....	....
28	29. 290	29. 280	29. 177	29. 249	....	....	....	40	71	56	55. 7	72	33	....	....	....	....
29	29. 192	29. 212	29. 221	29. 208	....	....	....	43	62	51	52	64	40	....	....	....	....
30	29. 334	29. 394	29. 336	29. 355	....	....	....	46	65	49	53. 3	66	37	....	....	....	....
Means....	29. 398	29. 395	29. 381	29. 391	....	....	....	38. 2	46. 9	43. 7	42. 9	....	....	....	....	....	....
May 1	29. 399	29. 369	29. 296	29. 355	42	50	45	44	63	49	52	67	34	. 241	. 189	. 247	. 226
2	29. 306	29. 349	29. 384	29. 346	46	54	43	49	63	46	52. 7	63	42	. 271	. 298	. 238	. 269
3	29. 432	29. 370	29. 326	29. 376	39	51	39	43	59	45	49	62	40	. 186	. 269	. 160	. 205
4	29. 270	29. 284	29. 299	29. 284	40	45	43	40	46	44	43. 3	47	39	. 248	. 286	. 264	. 266
5	29. 307	29. 246	29. 248	29. 267	39	48	48	41	49	48	46	45	37	. 212	. 322	. 335	. 290
6	29. 355	29. 374	29. 374	29. 368	38	42	42	38	42	42	40. 7	44	36	. 229	. 267	. 267	. 254
7	29. 332	29. 211	29. 194	29. 246	....	46	44	39	51	46	45. 3	54	38	....	. 245	. 262	. 169
8	29. 372	29. 336	29. 331	29. 346	39	52	47	39	64	51	51. 3	65	32	. 238	. 229	. 270	. 246
9	29. 376	29. 367	29. 358	29. 367	43	52	50	45	60	52	52. 3	63	41	. 251	. 282	. 334	. 289
10	29. 400	29. 339	29. 335	29. 358	54	56	53	59	63	57	59. 7	66	44	. 351	. 356	. 350	. 352
11	29. 351	29. 394	29. 438	29. 394	51	58	51	54	65	52	57	67	50	. 335	. 389	. 361	. 362
12	29. 365	29. 417	29. 423	29. 402	52	55	50	53	60	50	54. 3	61	48	. 375	. 367	. 361	. 368
13	29. 441	29. 361	29. 331	29. 378	50	59	59	51	66	51	56	67	45	. 348	. 407	. 473	. 409
14	29. 290	29. 268	29. 364	29. 307	40	48	46	40	48	46	44. 7	51	44	. 248	. 335	. 311	. 295
15	29. 451	29. 390	29. 331	29. 391	45	50	45	47	55	47	49. 7	55	41	. 273	. 295	. 273	. 280
16	29. 120	29. 107	29. 116	29. 114	51	54	48	55	60	49	54. 7	62	43	. 321	. 338	. 322	. 327
17	29. 258	29. 285	29. 291	29. 278	49	50	46	52	57	47	52	58	42	. 308	. 268	. 297	. 291
18	29. 341	29. 381	29. 421	29. 381	45	48	46	47	51	47	48. 3	52	42	. 273	. 296	. 297	. 289
19	29. 516	29. 505	29. 451	29. 491	47	50	48	49	57	51	52. 3	57	43	. 297	. 268	. 296	. 287
20	29. 483	39. 480	29. 475	29. 479	51	53	53	54	59	57	56. 7	60	49	. 335	. 323	. 350	. 336
21	29. 645	29. 648	29. 610	29. 634	54	59	52	57	67	55	59. 7	68	51	. 378	. 393	. 349	. 373
22	29. 680	29. 628	29. 520	29. 643	54	63	56	55	75	59	63	76	45	. 401	. 415	. 409	. 409
23	29. 490	29. 297	29. 306	29. 364	57	68	59	59	84	64	68. 7	84	49	. 439	. 537	. 433	. 470
24	29. 337	29. 306	29. 275	29. 306	53	59	52	56	64	57	59	65	51	. 363	. 433	. 322	. 373
25	29. 315	29. 320	29. 350	29. 328	55	66	57	57	78	59	64. 7	79	47	. 407	. 478	. 439	. 441
26	29. 438	29. 430	29. 455	29. 441	50	62	54	52	74	57	61	74	48	. 334	. 396	. 378	. 369
27	29. 555	29. 534	29. 512	29. 534	55	63	57	57	80	62	66. 3	81	49	. 407	. 349	. 399	. 385
28	29. 542	29. 482	29. 404	29. 476	57	64	58	62	81	65	69. 3	83	49	. 399	. 369	. 389	. 386
29	29. 384	29. 261	29. 148	29. 264	58	60	62	61	85	67	71	86	52	. 443	. 594	. 489	. 509
30	29. 027	25. 015	28. 864	28. 969	67	67	59	72	69	61	67. 3	76	59	. 595	. 635	. 473	. 568
31	28. 850	28. 797	28. 797	28. 815	62	63	59	63	64	60	62. 3	71	58	. 542	. 562	. 487	. 530
Means....	29. 368	29. 340	29. 326	29. 345	47. 8	55. 6	50. 6	51. 2	62. 4	53	55. 5	....	....	. 335	. 363	. 343	. 347

survey of the north and northwestern lakes, at Buffalo, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
......	......	......	......	W	SW	SW	2	25	4	10.0	S. 48 W.	10	10	10	......	.10
......	......	......	......	S.SW	W.NW	W.NW	35	25	4	15.2	S. 62 W.	10	10	0	......	....
......	......	......	......	NE	N. by W	N. by W	4	4	4	3.5	N. 6 E.	10	10	2	......	.04
......	......	......	......	NE	NW	NW	2	12	2	4.7	N. 37 W.	0	2	0	......	....
......	......	......	......	NE	NE	S.SW	2	2	4	0.5	S. 55 E.	10	10	2	......	....
......	......	......	......	SW	SW	N	2	2	4	1.0	N. 67 W.	10	10	10	......	....
......	......	......	......	NE	NE	N. by E	4	12	2	6.0	N. 41 E.	10	10	10	......	.10
......	......	......	......	NE	SW bvW	W.SW	2	2	2	0.7	S. 77 W.	10	10	1	......	.02
......	......	......	......	W.SW	W.SW	S.SE	2	12	2	4.7	S. 59 W.	0	0	0	......	....
......	......	......	......	S.SE	S.SW	SW	2	2	2	1.7	S. 16 W.	10	10	10	......	....
......	......	......	......	S	SW	W.NW	12	12	2	7.0	S. 27 W.	10	10	6	......	....
......	......	......	......	SW	N.NW.	NW	4	12	4	5.0	N. 43 W.	10	10	10	......	.14
......	......	......	......	NE	NE	E.NE	2	4	2	2.6	N. 50 E.	0	3	0	......	....
......	......	......	......	E.NE	E.NE	E.NE	2	4	2	2.7	N. 67 E.	10	10	1	......	....
......	......	......	......	E.NE	SE	SE	2	12	12	8.3	S. 49 E.	10	10	10	......	....
......	......	......	......	E. by N.	E. by N	E.NE	35	45	4	28.0	N. 78 E.	10	10	10	......	.26
......	......	......	......	NE	NE	SW	2	4	2	1.3	N. 45 E.	10	10	10	......	.10
......	......	......	......	N.NE	W.NW	E.NE	2	2	2	1.2	N. 13 E.	10	10	10	......	.20
......	......	......	......	E.NE	E. by N	E.NE	2	2	12	5.3	N. 69 E.	3	7	3	......	....
......	......	......	......	SW	S	E.NE	4	2	4	1.2	S. 15 E.	10	10	10	......	....
......	......	......	......	NW. by N	E.NE	NE	2	4	12	5.4	N. 44 E.	10	7	0	......	.94
......	......	......	......	NE	E	E.NE	4	12	4	6.3	N. 77 E.	0	6	1	......	....
......	......	......	......	E.NE	E	W.NW	2	2	2	0.8	N. 51 E.	2	10	9	......	....
......	......	......	......	E.NE	SW	NE	2	4	12	3.3	N. 49 E.	6	0	10	......	....
......	......	......	......	N.NW	NW	NW	4	12	4	6.7	N. 40 W.	0	0	0	......	....
......	......	......	......	NE	SW.bvW	W.SW	4	12	12	6.7	S. 65 W.	0	0	0	......	....
......	......	......	......	SW	W.SW	W.SW	2	4	2	2.6	S. 62 W.	0	10	2	......	....
......	......	......	......	S.SE	NW	E.SE	2	2	4	1.6	S. 66 W.	6	10	10	......	....
......	......	......	......	E.NE	E.NE	W.SW	12	12	2	7.3	N. 67 E.	10	10	10	......	....
......	......	......	......	E.NE	NE	E.NE	4	12	2	6.0	N. 53 E.	0	0	0	......	....,
......	......	......	......	....	....	....	....	....	....	0.8	N. 63 E.	6.4	7.3	5.2	......	1.90
.836	.329	.710	.625	E	SW.byW	W.SW	2	2	2	3.8	S. 39 W.	0	0	0	......	....
.781	.519	.767	.689	W SW.	NE	E.NE	4	12	4	4.0	N. 45 E.	0	10	10	......	....
.669	.537	.533	.580	E.NE	NE	E.NE	12	25	12	16.0	N. 56 E.	4	10	8	......	....
1.000	.921	.918	.946	E.NE	E.NE	E.NE	12	12	4	9.3	N. 67 E.	10	10	7	......	.04
.824	.926	1.000	.917	E.NE	E.NE	E.NE	12	45	45	34.0	N. 67 E.	10	10	10	......	....
1.000	1.000	1.000	1.000	E.NE	E.NE	E.NE	25	25	4	18.0	N. 67 E.	10	10	10	......	1.02
......	.653	.843	.748	NE	N.NE	N. NW	4	12	2	5.7	N. 23 E.	10	7	0	......	.04
1.000	.385	.722	.702	E.NE	E.NE	N	2	4	2	2.3	N. 52 E.	0	5	1	......	....
.840	.546	.861	.749	S	S	S	2	12	2	5.3	South	10	10	0	......	....
.703	.619	.752	.691	SW. by W	SW.byW	S	4	2	2	2.4	S. 43 W.	10	10	10	......	....
.802	.631	.938	.788	S	SW	E.NE	4	25	4	8.3	S. 35 W.	10	3	0	......	.02
.932	.708	1.000	.880	S	SW	W	2	12	12	7.7	S. 63 W.	10	10	10	......	....
.929	.636	.882	.816	S	S	E.NE	2	4	2	1.8	S. 19 E.	10	9	0	......	.02
1.000	1.000	1.000	1.000	N	NW	W.SW	4	12	4	5.5	N. 48 W.	10	10	10	......	.18
.847	.681	.847	.792	NW	SW	S.SW	2	12	2	4.6	S. 50 W.	2	1	0	......	.28
.743	.653	.926	.774	SW	SW	SW	4	12	2	6.0	S. 45 W.	10	10	3	......	....
.794	.577	.923	.765	SW	SW	W.SW	2	12	2	5.3	S. 47 W.	1	1	10	......	....
.847	.790	.923	.853	W.SW	W.SW	W.SW	2	25	4	10.3	S. 67 W.	10	10	6	......	....
.853	.577	.790	.740	W.SW	W.SW	W.SW	4	25	4	11.0	S. 67 W.	0	4	2	......	....
.802	.647	.752	.734	SW	SW	W.SW	12	25	12	16.0	S. 51 W.	10	10	3	......	....
.812	.505	.805	.737	SW	W.SW	W.SW	12	12	4	9.2	S. 58 W.	10	0	0	......	....
.934	.479	.819	.711	SW. by S	W.SW	SW	2	4	2	2.6	S. 53 W.	0	0	0	......	....
.878	.542	.727	.716	E.NE	W.SW	S.SE	2	4	2	0.9	S. 24 W.	0	0	0	......	....
.809	.727	.692	.743	SW	SW	W.SW	4	12	4	6.5	S. 51 W.	0	10	0	......	....
.874	.499	.878	.750	E	NE. by N	W.SW	2	4	4	0.7	N. 16 E.	0	0	0	......	....
.861	.472	.812	.718	NE. by N	E.NE	E.SE	2	12	2	5.0	N. 69 E.	10	10	0	......	....
.874	.341	.718	.644	E.NE	E	E NE	2	12	2	5.2	N. 84 E.	0	0	0	......	....
.718	.349	.631	.566	SW	SW	E.NE	2	2	2	0.7	S. 27 W.	10	10	10	......	....
.825	.410	.740	.658	NE	W.SW	N.NW.	2	2	2	0.9	N. 27 W.	10	10	10	......	....
.758	.896	.882	.845	S.SE	W.by S	S.SW	4	4	2	2.3	S. 27 W.	10	10	3	......	....
.942	.943	.940	.942	W.SW.	SW.by W	W.SW	4	12	12	9.3	S. 63 W.	10	10	10	......	.06
.849	.644	.829	.774	....	....	....	....	....	....	0.6	S. 2 E.	6.3	6.7	4.3	......	1.66

N.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	28. 813	28. 886	28. 922	28. 874	57	51	49	58	57	51	55. 3	63	50	. 452	. 295	. 321	. 356
2	29. 029	29. 130	29. 188	29. 116	51	53	51	52	55	52	53	58	48	. 361	. 376	. 361	. 366
3	29. 313	29. 324	29. 315	29. 317	49	54	50	54	61	53	56	62	47	. 269	. 325	. 321	. 305
4	29. 385	29. 351	29. 310	29. 349	52	56	51	53	66	55	58	67	39	. 375	. 316	. 321	. 337
5	29. 204	29. 331	29. 375	29. 333	56	61	52	61	70	53	61. 3	70	51	. 383	. 416	. 375	. 391
6	29. 501	29. 520	29. 543	29. 521	50	56	49	51	59	50	53. 3	62	46	. 348	. 409	. 335	. 364
7	29. 556	29. 537	29. 525	29. 539	48	50	50	49	56	53	52. 7	59	45	. 329	. 282	. 321	. 308
8	29. 461	29. 539	29. 390	29. 463	51	56	54	51	63	55	56. 3	67	48	. 347	. 356	. 404	. 369
9	29. 372	29. 339	29. 305	29. 339	55	59	56	58	63	57	59. 3	64	50	. 393	. 447	. 436	. 425
10	29. 354	29. 328	29. 272	29. 318	56	61	57	61	71	62	64. 7	73	50	. 383	. 403	. 399	. 395
11	29. 287	29. 228	29. 254	29. 256	59	62	60	60	71	61	64	72	54	. 487	. 436	. 505	. 476
12	29. 317	29. 328	29. 400	29. 348	59	60	58	60	67	59	62	67	57	. 487	. 425	. 469	. 460
13	29. 454	29. 458	29. 492	29. 468	60	65	61	61	75	62	66	78	57	. 505	. 483	. 523	. 504
14	29. 531	29. 470	29. 404	29. 468	62	64	61	66	74	55	65	75	56	. 502	. 462	. 483	. 482
15	29. 321	29. 311	29. 404	29. 345	62	64	56	66	70	61	65. 7	75	60	. 502	. 516	. 383	. 467
16	29. 553	29. 503	29. 365	29. 474	49	54	53	54	69	57	60	72	47	. 282	. 219	. 350	. 284
17	29. 131	29. 064	29. 060	29. 085	62	63	61	66	65	63	64. 7	69	53	. 502	. 549	. 510	. 520
18	29. 097	29. 091	29. 073	29. 087	58	63	58	60	70	62	64	71	57	. 456	. 482	. 429	. 456
19	29. 077	29. 123	29. 194	29. 131	52	65	59	56	73	61	63. 3	74	54	. 335	. 510	. 473	. 439
20	29. 209	29. 202	29. 232	29. 214	61	61	57	63	62	58	61	67	49	. 510	. 523	. 452	. 495
21	29. 285	29. 281	29. 280	29. 282	56	60	57	57	66	59	60. 7	67	53	. 436	. 438	. 439	. 438
22	29. 265	29. 244	29. 272	29. 260	56	58	57	57	61	58	58. 7	62	54	. 436	. 443	. 452	. 444
23	29. 410	29. 436	29. 480	29. 442	54	60	58	55	64	59	59. 3	65	50	. 404	. 465	. 469	. 446
24	29. 461	29. 548	29. 542	29. 517	57	61	55	66	67	58	63. 7	68	50	. 346	. 457	. 393	. 399
25	29. 555	29. 527	29. 511	29. 531	52	64	62	53	79	66	66	81	46	. 375	. 529	. 502	. 469
26	29. 501	29. 472	29. 488	29. 487	62	68	64	66	77	67	70	81	54	. 502	. 564	. 556	. 507
27	29. 526	29. 464	29. 448	29. 479	63	68	68	64	80	71	71. 7	84	56	. 562	. 564	. 644	. 577
28	29. 433	29. 381	29. 378	29. 397	65	74	64	69	89	71	76. 3	89	59	. 564	. 637	. 503	. 568
29	29. 328	29. 261	29. 243	29. 277	65	73	69	67	85	73	75	87	58	. 591	. 650	. 655	. 632
30	29. 268	29. 300	29. 290	29. 286	70	73	70	75	78	75	76	87	70	. 606	. 744	. 666	. 692
Means....	29. 336	29. 336	29. 332	29. 334	....	....	....	59. 8	68. 7	59. 9	62. 8	....	....	. 436	. 456	. 448	. 447

survey of the north and northwestern lakes, at Buffalo, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.937	.634	.859	.810	SW ...	W.SW	W.SW	25	60	45	42.3	S. 63 W.	10	10	10	......	.1r
.930	.869	.930	.910	W.SW.	WbyS.	W by S.	45	25	4	24.7	S. 72 W.	10	10	2	......	.04
.620	.606	.798	.675	N	SW ..	SW ..	12	12	12	6.0	S. 73 W.	7	8	6	......	....
.932	.495	.743	.723	S	SW ..	E.NE.	4	12	2	4.5	S. 30 W.	0	10	3	......	....
.713	.570	.932	.738	SW ...	SW ..	NE ...	2	12	4	3.3	S. 45 W.	0	3	10	......	....
.921	.819	.927	.892	NE	W.SW	SW ..	4	12	2	3.4	S. 71 W.	10	9	10	......	.30
.926	.627	.798	.784	NE	NE ...	NE ...	4	25	12	13.7	N. 45 E..	10	10	10	......	.04
1.000	.619	.934	.851	NE	NE ...	W	4	25	4	8.8	N. 38 E..	10	6	9	......	.02
.816	.776	.936	.843	W.SW.	SW.byW	SW ..	12	25	4	13.5	S. 58 W.	0	10	0	......	....
.713	.532	.718	.654	SW ...	SW ..	W.SW	12	12	2	8.5	S. 47 W.	0	10	3	......	....
.940	.576	.941	.819	W.SW.	NE ...	W.SW	12	12	2	3.3	N. 30 E..	10	10	10	......	....
.940	.642	.939	.840	NE	W.SW	W.SW	2	12	4	4.7	S. 71 W.	10	10	10	......	.06
.941	.558	.942	.814	W.SW.	W.SW	W.SW	2	12	4	6.0	S. 67 W.	10	3	1	......	....
.786	.551	.783	.707	SW ...	SW...	SW ..	4	12	12	9.3	S. 45 W.	0	0	6	......	....
.786	.704	.713	.734	SW ...	W.SW	N.NW.	25	35	4	19.3	S. 62 W.	2	0	0	......	....
.674	.309	.752	.578	E.NE ..	NE ...	SE ...	4	12	2	5.3	N. 58 E..	10	10	0	......	....
.786	.890	.886	.854	W	W.SW	W.SW	4	12	2	5.8	S. 71 W.	10	10	10	......	....
.880	.638	.772	.770	SW.byW	S	SW ..	4	2	2	2.4	S. 40 W	10	10	10	......	....
.747	.629	.882	.753	E	SW.byW	S	2	12	4	4.5	S. 37 W.	10	10	0	......	....
.886	.942	.937	.922	E	NE ...	S	2	2	2	1.2	S. 80 E..	10	10	0	......	....
.936	.685	.878	.533	S	SW ..	SW ..	4	4	12	6.3	S. 37 W.	10	10	10	......	.76
.936	.825	.937	.899	SW ...	SW ..	SW ..	4	12	4	6.7	S. 45 W.	10	10	10	......	.06
.934	.780	.939	.884	SW ...	W.SW	W.SW	4	25	4	10.8	S. 63 W.	10	10	10	......	.06
.543	.690	.816	.650	SW.byW	SW.byW	SE ...	2	4	2	1.9	S. 38 W.	6	2	0	......	....
.932	.747	.786	.822	NE	W.SW	E.NE.	2	4	2	0.3	N. 36 W.	0	0	8	......	....
.786	.808	.841	.812	E.NE ..	E	E.SE.	2	4	2	2.5	East	0	10	2	......	....
.943	.512	.850	.768	SE.....	E	SW ..	2	4	2	1.6	S. 55 E..	6	6	2	......	....
.796	.466	.663	.608	SE.....	SE....	SE ...	2	12	2	5.3	S. 45 E..	3	5	0	......	....
.893	.540	.807	.747	E	SE....	SE ...	2	25	12	12.8	S. 48 E..	1	10	10	......	....
.768	.776	.768	.771	SE	W.SW	SE ...	12	12	2	4.8	S. 5 W..	10	10	3	......	....
.838	.664	.847	.783	....	....	....	....	....	....	4.9	S. 53 W.	6.5	7.7	5.5	......	1.50

LAKE ONTARIO.

METEOROLOGICAL OBSERVATIONS.

Approximate height of lake above the level of the sea, 560 feet.

Location of stations and names of observers.

Fort Niagara, New York.—Lat. 43° 15′ N.; Long. 79° 55′ W.; height above the lake, 27.5 feet. Observer, L. Leffman.

Charlotte, New York.—Lat. 43° 12′ 34″ N.; Long. 77° 51′ W.; height above the lake, 37.5 feet. Observer, Andrew Mulligan.

Sackett's Harbor, New York.—Lat. 43° 55′ N.; Long. 75° 57′ W.; height above the lake, 30.6 feet. Observer, Henry Metcalf.

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.804	29.741	29.716	29.754	62	76	70	65	79	73	72.3	82	62	.516	.856	.693	.688
2	29.789	29.801	29.809	29.799	69	73	68	72	76	71	73.0	82	63	.668	.771	.644	.694
3	29.746	29.645	29.578	29.656	66	78	75	69.5	81	78	76.2	85	65	.592	.918	.827	.779
4	29.633	29.667	29.653	29.651	75	85	77	78	88	80	82.0	89	73	.827	1.162	.880	.959
5	29.748	29.653	29.718	29.706	71	77	71	74	80	74	76.0	87	71	.718	.887	.718	.774
6	29.911	29.935	29.891	29.912	65	71	69	68	74	72	71.3	77	64	.577	.718	.668	.654
7	29.914	29.780	29.765	29.819	64	78	78	67	82	81	76.7	84	62	.556	.904	.918	.793
8	29.630	29.610	29.510	29.583	77	83	79	80	86	82	82.7	88	79	.887	.087	.949	.974
9	29.422	29.480	29.543	29.482	78	79	70	81	82	74	79.0	83	70	.918	.949	.679	.849
10	29.668	29.718	29.605	29.664	67	71	68	71	74	71	72.0	75	67	.608	.718	.644	.657
11	29.641	29.598	29.550	29.596	67	73	78	70	76	81	75.7	81	65	.622	.771	.918	.770
12	29.858	28.753	29.816	29.809	68	75	66	71	78	69	72.7	82	66	.644	.827	.599	.690
13	29.945	29.671	29.829	29.815	64	69	65	67	72	68	69.0	75	61	.536	.668	.577	.601
14	29.711	29.601	29.543	29.618	65	68	64	68	70	67	68.3	73	63	.577	.682	.556	.605
15	29.667	29.869	29.809	29.782	60	67	61	63	70	64	65.7	72	60	.478	.622	.497	.532
16	29.947	30.183	30.115	30.082	57	65	58	60	68	61	63.0	70	60	.426	.577	.443	.482
17	30.117	30.069	29.987	30.058	57	70	65	60	73	68	67.0	74	56	.426	.693	.577	.565
18	29.999	29.866	29.724	29.863	62	73	68	65	76	71	70.7	79	61	.516	.771	.644	.644
19	29.811	29.796	29.711	29.773	63	71	67	66	73	70	69.7	75	63	.536	.731	.622	.629
20	29.834	29.838	29.759	29.807	63	76	71	65.5	79	74	72.8	81	63	.542	.856	.718	.705
21	29.817	29.861	29.635	29.771	65	71	70	67	74	73	71.3	76	64	.591	.718	.693	.667
22	29.565	29.490	29.789	29.615	70	73	70	73	75	73	73.7	77	68	.693	.784	.693	.723
23	29.789	29.733	29.907	29.809	62	69	62	65	70	65	66.7	72	65	.516	.695	.516	.575
24	30.054	30.042	29.940	30.012	55	62	55	58	65	58	60.3	66	53	.393	.516	.393	.434
25	29.887	29.809	29.679	29.792	55	73	70	58	76	73	69.0	79	52	.393	.771	.693	.619
26	29.744	29.623	29.600	29.656	69	80	65	71	82	77	76.7	82	63	.682	.996	.437	.712
27	29.643	29.593	29.513	29.583	65	69	67	68	72	70	70.0	78	65	.577	.668	.622	.622
28	29.536	29.743	29.503	29.594	65	73	67	68	75	70	71.0	76	65	.577	.784	.622	.661
29	29.745	29.699	29.646	29.696	61	68	60	64	71	63	66.0	73	62	.497	.644	.478	.539
30	30.047	30.017	29.859	29.974	53	62	55	56	65	58	59.7	66	53	.363	.516	.393	.424
31	29.840	29.615	29.433	29.629	55	72	62	57	75	72	68.0	76	54	.407	.744	.422	.524
Means . . .	29.789	29.757	29.714	29.753	64.3	72.6	67.4	67.2	73.4	71.0	71.2	....	....	.576	.774	.637	.662
*Sept. 1	29.391	29.236	29.252	29.293	70	64	55	73	69	58	66.7	74	55	.693	.529	.393	.538
2	29.702	29.770	29.733	29.735	47	52	52	49	53	52	51.3	58	46	.297	.375	.388	.353
3	29.994	29.962	29.837	29.931	48	65	59	50	67	62	59.7	68	46	.309	.591	.460	.453
4	29.858	29.911	29.814	29.861	65	78	67	67	80	70	72.3	80	60	.591	.931	.622	.715
5	29.796	29.847	29.600	29.748	70	81	73	72	84	76	77.3	85	70	.706	1.016	.771	.831
*6	29.638	29.641	29.613	29.641	69	75	74	72	78	77	75.7	82	66	.668	.827	.799	.765
*7	29.613	29.595	29.771	29.659	70	75	71	73	78	74	75.0	79	70	.693	.827	.718	.746
†8	29.593	39.615	29.791	29.666	70	69	62	72	71	65	69.3	76	62	.706	.682	.516	.635
9	29.992	30.017	29.987	29.999	57	62	56	60	65	59	61.3	65	56	.426	.516	.409	.450
10	30.025	29.931	29.997	29.984	53	65	63	56	68	66	63.3	70	51	.363	.577	.536	.492
11	29.977	29.857	29.773	29.869	63	81	73	65	83	76	74.7	83	62	.549	1.030	.771	.783
‡12	29.635	29.804	29.950	29.796	70	63	55	72	66	58	65.3	75	53	.706	.536	.393	.545
13	30.015	30.067	30.061	30.048	50	51	47	52	54	49	51.7	59	46	.334	.335	.297	.322
14	29.997	29.990	29.958	29.981	45	60	54	48	62	57	55.7	62	45	.260	.491	.378	.376
§15	29.885	29.817	29.925	29.876	53	65	60	56	68	63	62.3	70	53	.363	.577	.478	.473
16	29.983	29.923	29.865	29.924	55	60	54	58	62	57	59.0	64	52	.393	.491	.378	.421
17	29.914	29.682	29.523	29.706	51	62	67	54	65	70	63.0	71	51	.335	.516	.622	.491
18	29.511	29.684	29.659	29.618	70	71	65	73	74	68	71.7	74	63	.693	.718	.577	.663
19	29.865	29.982	29.855	29.900	59	60	55	61	63	57	60.3	68	52	.473	.478	.439	.463
20	29.997	29.812	29.847	29.885	58	65	59	60	68	62	63.3	70	53	.456	.577	.460	.497
21	29.990	29.967	29.947	29.968	56	62	62	58.5	65	63	62.2	67	52	.416	.516	.542	.491
22	30.005	29.848	29.827	29.893	59	75	65	61	78	68	69.0	78	55	.473	.827	.577	.626
‖23	29.819	29.685	29.599	29.701	60	78	70	63	79	72	71.3	80	60	.478	.945	.706	.709
24	29.765	29.892	29.827	29.828	54	60	53	57	63	56	58.7	70	54	.378	.478	.363	.406
25	30.005	29.822	29.773	29.867	47	62	54	49	65	56	56.7	76	46	.297	.516	.391	.401
26	29.847	29.815	29.757	29.806	51	65	58	53.5	68	61	60.8	70	50	.341	.577	.443	.453
27	29.833	29.760	29.692	29.761	52	65	60	54	67	62	61.0	67	52	.362	.591	.491	.481
28	29.757	29.641	29.634	29.677	57	68	65	59	70	67	65.3	73	56	.439	.658	.501	.563
29	29.665	29.667	29.722	29.685	60	67	60	63	70	62	65.0	70	60	.478	.622	.491	.330
30	29.750	29.861	29.854	29.822	52	49	48	55	51	50	52.0	62	48	.349	.321	.309	.326
Means . . .	29.827	29.803	29.782	29.804	58.0	65.8	60.5	60.5	68.5	63.1	64.0	....	....	.467	.622	.510	.533

*** Thunder storm.** **† Rain from 11 a. m. to 12 p. m.** **‡ Rain from**

of the north and northwestern lakes, at Fort Niagara, New York.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.836	.865	.854	.852	W	W	W	2	2	2	2.0	West	7	8	8	......	....
.852	.860	.850	.854	W	NW	NW	2	12	4	5.8	N. 49 W	10	9	5	......	....
.822	.868	.863	.851	S	S	S	12	4	2	6.0	South	9	9	7	......	....
.863	.878	.867	.869	W	W	W	25	35	2	20.7	West	6	8	10	......	....
.856	.867	.856	.859	W	W	W	12	25	35	24.0	West	10	10	10	......	....
.843	.856	.852	.850	W	W	W	12	4	2	6.0	West	7	10	10	......	....
.841	.828	.868	.846	S	SW	SW	2	4	25	10.1	S. 42 W	10	8	7	......	.05
.867	.875	.870	.871	S	W	W	12	2	4	4.5	S. 27 W	10	9	8	......	....
.868	.870	.810	.849	W	W	W	12	25	4	13.7	West	10	6	8	......	....
.802	.856	.850	.836	N	N	N	4	2	2	2.7	North	6	5	4	......	....
.848	.860	.868	.859	SW	S	S	2	2	4	2.5	S. 11 W	10	9	6	......	.06
.850	.863	.846	.853	W	W	W	2	12	25	13.0	West	6	6	8	......	....
.841	.852	.813	.815	E	N	N	12	4	2	4.5	N. 63 E	7	6	8	......	....
.843	.899	.841	.861	SW	SW	SW	4	12	2	6.0	S. 45 W	10	10	10	......	.31
.831	.848	.833	.837	NW	W	W	25	12	25	19.0	N. 72 W	10	5	6	......	....
.822	.843	.825	.830	N	W	W	12	4	2	4.5	N. 27 W	8	6	10	......	....
.822	.854	.843	.839	SW	SW	S	2	4	2	2.5	S. 34 W	7	10	10	......	....
.836	.860	.850	.849	S	N	N	12	2	2	2.7	South	8	8	7	......	....
.838	.932	.818	.863	W	NE	NE	2	2	2	1.0	N. 16 E	7	6	7	......	....
.864	.865	.856	.862	SW	NE	NE	4	2	2	0.0	....	8	8	8	......	....
.893	.856	.851	.867	S	NE	NE	2	25	4	9.3	N. 48 E	9	9	10	......	.04
.854	.904	.851	.871	S	W	W	25	25	2	12.3	S. 47 W	10	10	10	......	.31
.836	.948	.836	.873	W	W	W	4	35	35	24.7	West	6	7	6	......	....
.816	.836	.816	.823	E	E	W	25	35	4	18.7	East	7	5	7	......	....
.816	.860	.854	.843	SW	N	W	2	2	4	1.8	N. 83 W	4	6	10	......	....
.899	.912	.493	.768	W	W	SW	2	12	4	5.7	S. 81 W	7	6	10	......	.18
.843	.852	.848	.847	S	SW	SW	25	4	2	9.8	S. 9 W	10	10	10	......	.68
.843	.904	.848	.865	NW	W	W	2	4	2	2.5	N. 79 W	10	6	8	......	....
.833	.850	.831	.838	N	NW	N	25	2	35	20.4	N. 1 W	7	6	8	......	....
.809	.836	.816	.820	SE	N	N	12	12	2	3.3	N. 57 E	7	6	6	......	....
.874	.858	.539	.757	E	SW	SW	2	4	4	2.2	S. 33 W	9	9	10	......	.72
.844	.867	.825	.845	....	....	....	....	....	....	4.3	West	8.1	7.6	8.1	......	2.35
.854	.747	.816	.805	W	W	W	12	35	45	30.7	West	10	10	10	......	.04
.853	.932	1.000	.928	NW	W	W	45	25	12	25.2	N. 65 W	10	7	6	......	....
.856	.893	.828	.859	S	SW	SW	2	12	4	5.8	S. 41 W	8	7	8	......	....
.893	.910	.848	.884	SW	SW	SW	25	35	35	31.7	S. 45 W	8	6	7	......	....
.900	.873	.860	.877	W	W	W	25	25	12	20.7	West	9	7	8	......	....
.852	.863	.862	.859	S	W	W	12	4	2	4.5	S. 27 W	10	10	10	......	.38
.854	.863	.856	.858	S	S	S	4	25	4	11.0	South	10	10	10	......	.26
.900	.899	.836	.878	W	W	W	4	25	35	21.3	West	10	9	10	......	.42
.822	.836	.819	.826	SW	N	E	2	4	2	0.9	N. 13 E	8	5	4	......	....
.809	.843	.838	.830	S	NE	NE	2	25	4	9.3	N. 48 E	7	8	10	......	....
.890	.913	.860	.888	S	S	S	2	12	4	6.0	South	7	6	10	......	....
.900	.838	.816	.851	W	W	NW	12	35	25	22.3	N. 75 W	10	10	8	......	.26
.861	.802	.853	.839	NE	NE	NE	35	12	2	13.0	N. 45 E	10	10	8	......	....
.777	.884	.812	.824	SE	W	W	2	4	2	1.6	S. 73 W	8	7	10	......	....
.809	.843	.831	.828	S	NE	NE	2	25	12	12.0	N. 47 E	10	10	10	......	.30
.816	.684	.812	.837	E	N	N	25	25	4	13.0	N. 41 E	10	9	10	......	....
.802	.836	.848	.829	SW	N	S	2	35	25	2.9	N. 10 W	10	10	10	......	....
.854	.856	.843	.851	SW	W	W	35	25	12	22.0	S. 68 W	10	9	10	......	....
.882	.831	.878	.863	NW	W	W	35	4	2	13.0	N. 51 W	10	10	10	......	....
.880	.843	.828	.850	S	W	S	2	2	4	2.1	S. 19 W	10	6	9	......	....
.847	.836	.942	.875	S	S	S	2	2	2	2.0	South	10	10	8	......	....
.882	.863	.843	.863	SW	S	S	4	12	4	6.3	S. 8 W	7	8	9	......	....
.831	.954	.900	.895	S	S	S	12	35	25	24.0	South	5	8	10	......	.28
.812	.831	.809	.817	N	NW	NW	45	35	25	32.3	N. 26 W	10	7	8	......	....
.853	.846	.872	.859	S	W	W	4	4	4	3.0	S. 63 W	6	7	10	......	....
.832	.843	.825	.833	SW	W	W	4	2	12	5.7	S. 81 W	7	6	8	......	....
.867	.893	.884	.881	SW	N	S	2	25	2	7.1	N. 3 W	7	9	10	......	....
.878	.898	.893	.889	W	N	W	4	12	25	10.5	N. 67 W	10	10	10	......	....
.831	.848	.874	.851	W	NW	NE	2	2	45	14.7	N. 41 E	10	10	10	......	....
.805	.859	.856	.840	NE	E	NE	12	12	35	18.8	N. 54 E	10	10	10	......	....
.850	.861	.855	.855	....	....	....	....	....	....	5.2	N. 77 W	8.9	8.3	9.0	......	1.94

8 to 10 a. m. § Rain from 1 to 5 p. m. ‖ Rain from 1 to 6 a. m.

O.—*Reductions of the monthly meteorological register of the*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°						
Oct. 1	29.869	29.841	29.784	29.831	45	50	50	48	53	52	51.0	54	45	.260	.321	.334	.305
2	29.821	29.789	29.712	29.774	54	65	64	57	68	66	63.7	69	51	.378	.577	.569	.508
3	29.850	29.821	29.618	29.763	60	65	64	63	68	66	65.7	70	60	.478	.577	.569	.541
4	29.596	29.555	29.709	29.620	68	72	60	70	75	62	69.0	75	60	.658	.744	.491	.631
5	30.002	30.107	30.031	30.047	50	56	48	53	57	50	53.3	67	46	.341	.436	.309	.355
6	29.917	29.638	29.491	29.682	41	59	65	44	61	68	57.7	68	42	.218	.473	.577	.423
7	29.458	29.533	29.588	29.526	65	75	71	67	78	74	73.0	79	65	.591	.827	.718	.712
8	29.498	29.512	29.418	29.476	70	80	75	73	82	78	77.7	82	71	.683	.906	.827	.839
9	29.737	29.872	29.983	29.864	55	58	55	57	60	57	58.0	80	55	.407	.456	.407	.423
10	29.950	29.641	29.551	29.714	50	52	48	52	55	50	52.3	57	48	.334	.349	.309	.331
11	29.715	29.960	29.827	29.834	45	51	49	48	53	51	50.7	57	46	.260	.348	.321	.309
12	29.822	29.844	29.749	29.805	46	51	47	49	54	49	50.7	55	47	.271	.335	.297	.301
13	29.741	29.774	29.791	29.769	48	55	53	50	58	56	54.7	57	46	.309	.393	.363	.355
14	29.730	29.742	29.754	29.742	49	58	48	51	60	50	53.7	60	48	.321	.456	.309	.362
15	29.954	29.955	29.814	29.908	40	40	39	43	42	41	42.0	50	39	.208	.221	.212	.214
16	29.673	29.578	29.456	29.569	37	45	45	39	48	47	44.7	50	35	.194	.260	.273	.242
17	29.661	29.778	29.807	29.749	45	50	50	48	53	52	51.0	53	44	.260	.321	.334	.305
18	30.017	29.947	29.794	29.919	40	56	51	42	59	54	51.7	60	40	.221	.407	.335	.322
19	29.654	29.606	29.677	29.646	55	51	45	58	54	46	52.7	59	45	.393	.335	.286	.338
20	29.810	29.827	29.691	29.776	36	45	43	39	48	46	44.3	49	39	.173	.260	.238	.224
21	29.354	29.381	29.117	29.284	53	50	50	55	52	53	53.3	56	45	.376	.334	.321	.344
22	29.282	29.319	29.508	29.369	40	44	42	43	47	43	45.0	54	39	.208	.249	.228	.228
23	29.827	30.034	30.977	29.946	40	43	39	42	45	41	42.7	46	39	.221	.251	.212	.228
24	29.855	29.719	29.616	29.730	40	56	56	43	59	58	53.3	60	39	.208	.409	.422	.346
25	29.825	30.055	30.035	29.972	36	37	35	38	39	38	38.3	60	35	.186	.194	.165	.181
26	29.991	29.845	29.659	29.832	31	34	34	34	36	36	35.3	39	33	.139	.170	.170	.159
27	29.672	29.646	29.682	29.666	32	39	38	35	41	40	38.7	42	34	.142	.212	.203	.186
28	29.697	29.735	29.644	29.699	37	43	40	39	46	43	42.7	46	35	.194	.238	.208	.213
29	29.814	29.889	29.834	29.846	41	45	43	43	47	46	45.3	48	41	.231	.273	.238	.247
30	29.927	29.792	29.699	29.806	40	30	49	42	52	56	50.0	58	37	.221	.334	.255	.270
31	29.800	29.629	29.598	29.672	52	62	61	55	66	64	61.7	67	52	.349	.502	.497	.449
Means....	29.758	29.754	29.700	29.737	46.4	52.8	50.2	49.0	55.4	52.8	52.4	....	....	.304	.395	.352	.351
Nov. 1	29.719	29.675	29.531	29.642	52	63	55	55	65	57	59.0	65	54	.349	.549	.407	.435
2	29.538	29.482	29.208	29.409	58	50	48	60	53	50	54.3	61	49	.456	.321	.309	.362
3	29.469	29.618	29.844	29.644	40	43	38	42	45	40	42.3	50	37	.221	.251	.203	.225
4	29.995	29.907	29.787	29.896	27	45	35	29	48	38	38.3	48	27	.124	.260	.165	.183
5	29.608	29.663	29.662	29.644	40	51	38	43	54	40	45.7	55	37	.208	.335	.203	.249
6	29.823	29.788	29.707	29.773	30	31	27	32	33	29	31.3	42	27	.144	.151	.124	.139
7	29.835	29.873	29.850	29.853	30	28	29	32	30	31	31.0	32	27	.144	.130	.137	.137
8	29.781	29.815	29.874	29.823	25	30	29	28	32	31	30.3	33	25	.100	.144	.137	.127
9	29.874	29.817	29.805	29.832	31	38	39	31	40	41	38.3	42	32	.139	.203	.212	.185
10	29.952	29.928	29.827	29.902	35	42	38	38	45	40	41.0	47	37	.165	.228	.203	.199
11	29.809	29.582	29.422	20.604	37	52	53	39	53	55	49.0	56	31	.194	.375	.376	.315
12	29.830	29.865	29.782	29.826	40	41	39	43	42	41	42.0	57	37	.208	.244	.212	.221
13	30.001	29.965	29.876	29.947	34	40	36	37	42	38	39.0	43	37	.157	.221	.186	.188
14	29.909	29.931	30.114	29.985	43	41	35	45	44	37	42.0	47	36	.251	.218	.178	.216
15	30.460	30.539	30.617	30.539	24	25	20	25	28	23	25.3	47	21	.117	.100	.085	.100
16	30.448	30.304	30.134	30.295	21	35	39	24	37	41	34.0	42	21	.078	.178	.212	.156
17	29.975	29.912	30.069	29.985	45	47	40	47	49	43	46.3	51	39	.273	.297	.208	.259
18	30.152	29.909	29.829	29.963	36	42	41	39	44	43	42.0	45	34	.173	.241	.231	.215
19	29.545	29.538	29.418	29.500	42	43	40	45	44	43	44.0	45	42	.228	.264	.208	.233
20	29.334	29.421	29.583	29.446	40	35	30	42	37	31	36.7	44	35	.221	.178	.155	.185
21	29.602	29.638	29.610	29.616	30	31	32	32	34	33	33.0	44	30	.144	.139	.168	.150
22	29.621	29.520	29.478	29.539	30	35	30	31	37	33	33.7	38	28	.155	.178	.132	.155
23	29.472	29.836	29.967	29.758	27	31	30	29	32	32	31.0	35	23	.124	.162	.144	.143
24	29.807	29.654	29.730	29.730	30	40	32	31	42	35	36.0	42	28	.155	.221	.142	.173
25	29.659	29.684	29.535	29.626	35	43	39	38	44	40	40.7	45	20	.165	.264	.225	.218
26	29.546	29.548	29.592	29.562	35	37	35	38	39	37	38.0	42	30	.165	.194	.178	.179
27	29.538	29.428	29.290	29.419	33	32	30	34	33	30	32.3	39	29	.175	.168	.167	.170
28	29.246	29.398	29.305	29.315	30	33	31	31	34	33	32.7	39	27	.155	.175	.151	.160
29	29.452	29.454	29.541	29.482	31	32	32	32	36	33	33.7	41	30	.162	.129	.168	.153
30	29.677	29.611	29.694	29.660	31	35	33	32	36	34	34.0	40	29	.162	.191	.175	.176
Means....	29.756	29.746	29.723	29.744	34.7	39.0	35.7	36.9	41.0	37.7	38.6	....	....	.184	.223	.193	.200

survey of the north and northwestern lakes, at Fort Niagara, N. Y.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1. 000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.777	.798	.861	.812	NE	NE	NE	25	35	45	35.0	N. 45 E.	10	10	10	......	....
.812	.843	.891	.849	NW	S	S	4	12	2	3.9	S. 14 W.	10	10	10	......	.38
.831	.843	.891	.855	N	NE	N	2	12	2	5.0	N. 34 E.	10	10	10	......	.26
.898	.858	.884	.880	S	SW	W	35	25	45	27.0	S. 50 W.	10	10	9	......	....
.798	.936	.856	.863	W	W	SW	35	12	12	18.7	S. 81 W.	7	4	8	......	....
.756	.882	.843	.827	SE	SW	SW	4	2	25	9.1	S. 37 W.	10	10	10	......	.20
.893	.863	.856	.870	W	W	SW	2	12	25	12.0	S. 61 W.	10	7	6	......	....
.854	.912	.863	.876	SW	SW	S	25	35	45	32.3	S. 26 W.	9	9	10	......	.26
.874	.880	.874	.876	W	S	NE	12	4	35	8.0	N. 31 E.	10	10	10	......	.10
.861	.805	.856	.841	S	NE	NE	4	35	60	30.8	N. 47 E.	10	10	10	......	.40
.777	.864	.879	.833	W	NE	N	2	35	4	12.1	N. 39 E.	10	7	10	......	....
.781	.802	.853	.812	S	NE	NE	2	12	25	11.8	N. 48 E.	10	10	10	......	....
.856	.816	.809	.827	SW	N.	S	2	2	2	0.7	S. 45 W.	10	10	10	......	....
.859	.880	.836	.865	SW	W	NW	2	12	45	18.3	N. 56 W.	6	10	10	......	....
.750	.829	.824	.801	NE	W	W	35	12	4	8.7	N. 19 E.	10	10	10	......	....
.816	.777	.847	.813	S	SW	S	4	2	4	3.1	S. 9 W.	10	10	10	......	.22
.777	.798	.861	.812	W	W	NW	25	35	25	26.5	N. 77 W.	10	10	10	......	....
.829	.819	.802	.816	SW	S	S	4	25	12	13.3	S. 4 W.	7	8	10	......	....
.816	.802	.921	.846	S	W	NW	25	45	60	29.8	S. 79 W.	4	6	7	......	....
.726	.777	.767	.757	N	W	S	45	12	12	11.7	N. 20 W.	10	10	10	......	....
.869	.861	.798	.842	SW	SW	SW	35	45	45	41.7	S. 45 W.	10	10	10	......	.24
.750	.772	.762	.761	NW	W	W	35	45	60	43.8	N. 79 W.	10	10	10	......	....
.829	.840	.824	.831	NW	W	W	35	12	4	15.8	N. 59 W.	10	7	10	......	.14
.750	.819	.876	.815	SW	SW	S	2	25	12	12.2	S. 31 W.	10	8	10	......	.28
.811	.816	.719	.782	NW	NW	NE.	35	12	45	21.8	N. 1 W.	10	10	10	......	.14
.712	.802	.802	.772	SW	NE	NE	12	45	60	31.0	N. 45 E.	10	10	10	......	.74
.698	.824	.820	.781	N	W	S	35	25	12	11.3	N. 47 W.	10	8	10	......	....
.816	.767	.750	.778	SW	S	S	4	2	4	3.1	S. 18 W.	10	10	10	......	.30
.833	.847	.767	.816	S	S	NW	2	25	35	8.3	S. 84 W.	6	10	10	......	....
.829	.861	.569	.753	S	SW	S	4	35	45	25.8	S. 18 W.	8	9	10	......	....
.805	.786	.833	.808	S	S	S	35	45	35	38.3	South	10	7	9	......	....
.808	.831	.825	.821	....	....	....	....	....	....	5.5	S. 88 W.	9.2	9.0	9.6	......	3.66
.805	.890	.874	.856	S	S	SW	12	35	25	22.5	S. 15 W.	7	6	9	......	....
.880	.798	.856	.845	SW	NW	NE.	35	4	75	13.3	N. 39 E.	10	10	10	......	.30
.829	.840	.820	.830	SW	N	NW	35	25	45	21.7	N. 60 W.	10	10	10	......	....
.775	.777	.719	.757	SW	SW	W	4	2	4	3.1	S. 63 W.	10	8	8	......	....
.750	.802	.820	.791	SW	SW	W	4	2	45	16.3	S. 85 W.	10	10	10	......	.10
.794	.800	.775	.789	N	N	NE.	25	4	4	10.7	N. 5 E.	10	8	10	......	....
.794	.782	.788	.788	NE	NE.	N	60	45	45	47.0	N. 32 E.	10	10	10	......	....
.655	.794	.788	.746	NE	W	S	45	12	2	11.8	N. 33 E.	10	10	10	......	.10
.712	.820	.824	.785	NW	NW	NW	12	35	45	30.7	N. 45 W.	10	7	10	......	....
.719	.762	.820	.767	W	W	W	4	2	2	2.7	West	10	7	9	......	....
.816	.932	.869	.872	S	S	SW.	12	35	60	33.0	S. 25 W.	10	10	10	......	.06
.750	.914	.824	.829	W	NW	W	25	2	2	9.3	N. 87 W.	10	8	10	......	....
.712	.829	.811	.784	S	NW	W	4	25	12	10.8	N. 65 W.	10	7	10	......	....
.840	.756	.807	.801	SW	W	NW	12	35	60	30.3	N. 69 W.	10	10	10	......	....
.872	.655	.721	.749	N	N	E	45	25	12	23.8	N. 10 E.	10	8	10	......	....
.610	.807	.824	.747	NE	NE.	SW	25	35	25	11.7	N. 45 E.	10	7	10	......	.32
.847	.853	.750	.817	SW	W	NW	12	2	45	16.0	N. 61 W.	10	10	10	......	....
.726	.836	.833	.798	S	N	E	2	4	2	1.0	N. 45 E.	10	10	10	......	.30
.762	.918	.750	.810	NW	NE	NE	12	25	45	23.8	N. 35 E.	10	10	10	......	.06
.829	.807	893	.843	NE	N	NE.	25	25	35	26.7	N. 32 E.	10	10	10	......	.24
.794	.712	.893	.799	S	NW	N.	2	4	12	4.3	N. 12 W.	10	10	10	......	....
.893	.807	.703	.801	W.	NW	NW	2	35	60	32.2	N. 46 W.	10	10	10	......	....
.775	.896	.794	.822	NW	NW	NW	45	60	45	50.0	N. 45 W.	10	10	10	......	....
.893	.829	.698	.807	W.	S	SW	4	12	4	6.1	S. 24 W.	10	8	10	......	....
.719	.918	.910	.849	S	W	SW	4	2	12	5.3	S. 40 W.	10	10	10	......	....
.719	.816	.807	.781	NW	W	NW	25	35	35	29.5	N. 61 W.	10	10	10	......	....
.895	.893	1.000	.929	NW	SW	S	12	25	4	10.0	S. 63 W.	10	10	10	......	.36
.893	.895	.800	.863	S	SW	SW	2	25	4	10.0	S. 42 W.	10	10	10	......	....
.896	.610	.893	.800	S	S.	S	4	2	2	2.7	South	10	7	8	......	....
.869	.900	.895	.897	S	SW	NE.	2	12	12	0.7	South	10	10	10	......	....
.795	.821	.808	.812	....	....	....	....	....	....	8.7	N. 40 W.	9.9	9.0	9.8	......	1.84

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.677	29.754	29.741	29.724	36	35	33	37	36	36	36.3	37	29	.199	.191	.149	.179
2	29.949	29.809	29.843	29.897	29	29	31	30	30	33	31.0	37	26	.149	.149	.151	.150
3	29.807	29.637	29.654	29.699	27	30	26	28	31	28	29.0	32	27	.136	.155	.117	.136
4	29.717	29.665	29.538	29.640	26	34	30	28	35	31	31.3	35	22	.117	.183	.155	.152
5	29.528	29.441	29.345	29.438	29	31	....	30	33	26	29.7	35	26	.149	.151	....	.150
6	29.366	29.503	29.671	29.513	19	14	12	20	15	13	16.0	30	11	.092	.071	.063	.075
7	29.865	29.924	29.875	29.888	10	11	19	11	12	20	14.3	21	10	.057	.061	.092	.070
8	30.040	29.847	29.804	29.897	17	23	20	18	25	21	21.3	26	15	.083	.100	.096	.093
9	29.955	29.981	29.887	29.941	23	29	25	24	30	27	27.0	31	16	.112	.149	.112	.124
10	29.863	29.864	29.741	29.823	29	38	39	30	40	41	37.0	41	27	.149	.203	.212	.191
11	29.656	29.598	29.581	29.612	39	48	43	41	50	45	45.3	51	38	.212	.309	.251	.257
12	29.825	29.855	29.829	29.836	40	40	36	42	41	38	40.3	48	35	.221	.235	.186	.214
13	29.749	29.775	29.659	29.727	37	44	47	39	46	48	44.3	50	37	.194	.262	.310	.255
14	29.724	29.707	29.476	29.636	51	50	51	53	52	53	52.7	55	49	.348	.334	.348	.343
15	29.451	29.340	29.288	29.359	53	52	40	55	54	41	50.0	58	40	.376	.362	.235	.324
16	29.246	29.473	29.458	29.392	33	33	30	35	35	31	33.7	42	30	.162	.162	.155	.159
17	29.885	30.127	30.239	30.083	....	21	21	21	23	22	22.0	33	19	....	.090	.101	.095
18	30.214	30.061	29.881	30.062	17	26	30	18	28	31	25.7	32	16	.083	.117	.155	.118
19	29.790	30.087	30.194	30.024	34	20	....	36	21	15	24.0	36	10	.170	.096	....	.133
20	30.340	30.502	30.315	30.386	7	9	7	8	10	8	8.7	12	7	.048	.054	.048	.050
21	30.200	30.087	29.892	30.059	7	18	21	....	20	23	17.3	24	7	.037	.076	.090	.068
22	29.805	29.627	29.684	29.735	30	38	36	31	40	38	36.3	41	21	.155	.203	.186	.181
23	29.827	29.981	29.969	29.926	34	33	33	36	35	34	35.0	40	24	.170	.162	.175	.169
24	29.963	29.855	29.754	29.857	26	31	33	28	32	34	31.3	35	27	.117	.162	.175	.151
25	29.613	29.618	29.525	29.585	47	48	42	48	50	44	47.3	51	34	.310	.309	.241	.287
26	29.455	29.413	29.305	29.391	38	37	36	40	39	38	39.0	46	37	.203	.194	.186	.194
27	29.517	29.595	29.505	29.539	33	36	31	36	38	34	36.0	40	32	.149	.186	.139	.158
28	29.579	29.662	29.441	29.561	31	38	....	33	41	35	36.3	41	33	.151	.190	....	.170
29	29.429	29.659	29.663	29.584	39	41	35	40	43	36	39.7	43	33	.225	.231	.191	.216
30	29.725	29.763	29.654	29.714	29	27	27	30	28	28	28.7	38	28	.149	.136	.136	.140
31	29.827	29.979	30.011	29.939	22	24	20	23	26	22	23.7	31	20	.107	.106	.085	.099
Means....	29.764	29.783	29.723	29.757	29.7	32.9	30.5	30.9	33.5	31.4	31.9	....	....	.161	.174	.162	.164
1863.																	
Jan. 1	30.105	29.933	29.911	29.983	25	33	29	27	36	30	31.0	36	21	.112	.149	.149	.137
2	29.835	29.835	29.606	29.759	....	41	38	31	42	40	37.7	43	27	....	.244	.203	.223
3	29.767	29.647	29.585	29.667	43	48	43	45	48	45	46.0	50	39	.251	.335	.251	.279
4	29.374	28.958	29.240	29.191	41	54	40	44	56	42	47.3	56	37	.218	.391	.221	.277
5	29.462	29.414	29.256	29.377	39	46	41	40	48	43	43.7	48	35	.225	.284	.231	.247
6	29.228	29.317	29.321	29.292	37	35	28	38	37	30	35.0	45	30	.207	.178	.130	.172
7	29.685	29.899	30.071	29.885	17	19	20	18	20	21	19.7	32	17	.083	.092	.096	.090
8	30.065	30.041	30.111	30.072	21	24	23	22	26	24	24.0	26	18	.101	.106	.112	.106
9	30.089	30.077	29.938	30.035	26	31	26	28	32	28	29.3	32	23	.117	.162	.117	.132
10	29.667	29.260	29.328	29.418	34	36	35	35	38	36	36.3	39	26	.183	.186	.191	.187
11	29.316	29.443	29.600	29.453	30	30	30	32	32	30	31.3	37	30	.144	.144	.167	.152
12	29.879	29.824	29.991	29.898	23	30	30	24	31	32	29.0	35	23	.112	.155	.144	.137
13	30.057	30.002	29.791	29.950	30	29	31	31	30	33	31.3	33	29	.155	.149	.151	.152
14	29.464	29.320	29.385	29.389	45	43	37	47	46	39	44.0	49	32	.273	.238	.194	.235
15	29.507	29.413	29.206	29.375	31	28	26	33	30	27	30.0	41	26	.151	.130	.129	.137
16	29.065	29.272	29.461	29.266	....	9	9	16	10	9	11.7	30	9	....	.054	.065	.059
17	29.960	30.233	30.305	30.166	9	10	9	10	12	9	10.3	17	8	.054	.046	.065	.055
18	30.338	30.445	30.299	30.361	6	21	10	8	23	12	14.3	25	6	.034	.090	.046	.057
19	30.260	30.223	30.167	30.217	21	32	25	22	35	27	28.0	36	12	.101	.142	.112	.118
20	30.122	30.075	29.944	30.047	23	29	27	25	30	28	27.7	35	24	.100	.149	.136	.128
21	29.865	29.979	29.941	29.932	26	33	30	28	35	33	32.0	36	28	.117	.162	.132	.137
22	29.939	29.898	29.869	29.902	28	37	34	29	39	36	34.7	40	29	.142	.194	.170	.169
23	29.817	29.964	29.936	29.906	32	36	31	35	38	33	35.3	40	30	.142	.186	.151	.159
24	29.874	29.822	29.811	29.836	30	39	40	31	4	43	38.3	49	31	.155	.212	.208	.192
25	30.010	30.081	29.947	30.013	32	41	33	35	43	35	37.7	44	33	.142	.231	.162	.145
26	29.819	29.663	29.571	29.684	31	35	32	34	36	35	35.0	37	32	.139	.191	.142	.157
27	29.454	29.623	29.646	29.574	30	30	30	33	32	31	32.0	36	30	.132	.144	.155	.144
28	29.799	29.705	29.578	29.694	26	27	26	28	29	27	28.0	30	26	.117	.124	.129	.123
29	29.572	29.463	29.356	29.443	26	26	26	28	27	28	27.7	30	25	.117	.129	.117	.121
30	29.419	29.522	29.665	29.535	30	33	30	33	35	32	33.3	36	29	.132	.162	.144	.146
31	29.646	29.632	29.663	29.647	29	31	31	30	33	32	31.7	34	30	.149	.151	.162	.154
Means....	29.755	29.741	29.726	29.740	28.3	32.1	29.0	29.7	34.0	30.6	31.4	....	....	.141	.171	.147	.152

of the north and northwestern lakes, at Fort Niagara, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
											°					
.903	.900	.705	.836	NW	W	W	35	25	25	26.2	N. 72 W.	10	10	10	......	....
.890	.890	.800	.860	W	W	W	45	35	12	30.7	West	10	10	10	......	....
.883	.893	.768	.848	S	SW	W	12	4	12	7.0	S. 45 W.	10	10	10	......	.32
.768	.898	.893	.853	SW	W	NE	25	4	25	1.3	West	10	8	10	......	....
.890	.800	......	.845	W	W	NE	4	25	25	7.0	N. 33 W.	10	10	10	......	....
.850	.823	.810	.827	NW	NW	NW	45	60	60	55.0	N. 45 W.	10	10	10	......	....
.797	.804	.850	.817	W	NW	W	45	35	45	39.2	N. 78 W.	10	10	10	......	....
.840	.746	.855	.814	S	S	SE	4	35	12	16.1	S. 10 E.	10	10	8	......	....
.868	.890	.761	.839	SW	W	NW	4	2	25	9.0	N. 57 W.	10	10	10	......	....
.870	.820	.824	.845	W	S	SW	4	35	35	22.0	S. 26 W.	10	8	10	......	....
.824	.856	.840	.840	S	S	W	45	35	45	30.8	S. 29 W.	10	7	10	......	....
.829	.912	.811	.850	NW	W	NE	12	4	25	9.0	N. 11 E.	10	10	10	......	....
.816	.813	.925	.861	SW	SW	S	35	45	25	33.0	S. 35 W.	10	10	10	......	.30
.864	.861	.864	.863	SW	SW	SW	25	12	35	24.0	S. 45 W.	10	10	10	......	.24
.869	.867	.912	.883	S	SW	SW	12	35	12	18.7	S. 36 W.	10	10	10	......	.46
.797	.797	.893	.829	W	W	W	35	12	45	30.7	West	10	10	10	......	....
......	.730	.860	.795	N	SW	W	25	35	45	23.2	West	10	7	10	......	....
.840	.768	.893	.834	S	SW	SW	12	45	35	29.5	S. 40 W.	10	10	10	......	....
.802	.855	......	.828	W	W	W	35	60	75	56.7	West	10	10	10	......	....
.777	.791	.777	.782	N	NW	SE	25	12	4	10.3	N. 10 W.	10	10	10	......	....
.568	.702	.730	.666	SE	S	NE	2	2	4	1.4	S. 82 E.	10	10	10	......	....
.893	.820	.811	.841	SW	NW	W	4	12	25	12.3	N. 81 W.	10	10	10	......	.10
.802	.797	.895	.831	N	N	NE	35	25	45	32.3	N. 19 E.	10	10	10	......	....
.768	.896	.895	.853	NE	NW	NE	12	12	4	6.7	N. 8 E.	10	10	10	......	....
.925	.856	.836	.872	S	SW	W	25	2	2	9.0	S. 7 W.	10	10	10	......	....
.820	.816	.811	.816	SW	SW	NW	2	2	4	1.9	West	10	10	10	......	.50
.705	.811	.712	.743	W	NW	W	12	25	12	15.0	N. 67 W.	10	10	10	......	....
.800	.738	......	.769	SW	SW	SW	2	25	12	13.0	S. 45 W.	10	6	10	......	....
.910	.833	.900	.881	W	W	W	4	4	35	14.3	West	10	10	10	......	....
.890	.883	.883	.885	N	N	N	35	45	60	46.7	North	10	10	10	......	....
.864	.754	.721	.813	NW	NW	SW	35	4	4	13.0	N. 51 W.	10	4	9	......	....
.831	.827	.829	.829	....	....	....	....	....	....	12.9	N. 88 W.	10.0	9.3	9.9	......	1.92
.761	.705	.890	.785	W	S	SW	2	25	12	11.8	S. 17 W.	6	8	10	......	....
......	.914	.820	.867	S	SW	SW	2	12	25	12.8	S. 42 W.	10	7	10	......	....
.840	1.000	.840	.893	S	SW	S	4	2	2	2.5	S. 11 W.	10	10	10	......	....
.756	.872	.829	.819	S	S	W	35	75	25	37.7	S. 13 W.	10	10	9	......	....
.910	.850	.833	.864	SW	SW	W	35	12	2	15.8	S. 47 W.	10	7	10	......	....
.905	.807	.782	.831	W	W	W	25	25	45	35.0	West	10	10	10	......	....
.840	.850	.855	.848	NW	W	W	60	45	25	39.8	N. 69 W.	10	10	10	......	.06
.860	.754	.868	.861	SW	S	S	2	12	4	5.8	S. 5 W.	10	10	10	......	.10
.768	.896	.768	.811	SW	S	S	2	2	4	2.5	S. 11 W.	10	10	10	......	....
.898	.811	.900	.869	S	S	SW	25	45	25	30.3	S. 11 W.	10	10	10	......	.18
.794	.794	1.000	.863	SW	NW	NW	12	35	45	27.2	N. 53 W.	10	10	10	......	....
.868	.893	.794	.852	S	SW	NE	2	4	4	0.7	South	10	6	10	......	....
.893	.890	.800	.861	NE	E	E	25	35	25	26.5	N. 77 E.	10	10	10	......	.12
.847	.767	.816	.810	SE	SW	SW	25	4	25	12.8	S. 4 W.	10	10	10	......	.40
.800	.782	.880	.821	NW	NE	NE	25	35	60	32.7	N. 30 E.	10	10	10	......	1.70
......	.791	1.000	.895	NE	NW	NW	60	45	60	40.3	N. 15 W.	10	10	10	......	.08
.791	.610	1.000	.800	NW	N	N	25	25	12	19.2	N. 18 W.	10	10	10	......	....
.553	.730	.610	.631	S	SE	E	2	4	4	2.7	S. 55 E.	7	6	10	......	....
.860	.698	.761	.773	S	SW	NE	4	2	2	1.3	South	7	8	10	......	....
.746	.890	.883	.839	S	NE	NE	12	35	25	17.3	N. 54 E.	10	10	10	......	....
.768	.797	.703	.756	NE	N	NE	25	12	25	19.7	N. 37 E.	10	10	10	......	....
.887	.816	.802	.835	S	S	SE	4	2	4	3.1	S. 18 E.	6	10	10	......	....
.698	.811	.800	.790	S	W	SW	2	4	4	2.7	S. 55 W.	10	10	10	......	....
.893	.824	.750	.822	NE	S	SW	25	35	25	11.7	South	10	10	10	......	....
.698	.833	.797	.776	W	SW	SW	12	25	4	12.7	S. 58 W.	10	10	8	......	....
.712	.900	.698	.770	S	NE	NE	2	4	25	9.2	N. 48 E.	10	10	10	......	.44
.703	.794	.893	.797	N	NE	NE	45	25	12	25.3	N. 20 E.	10	10	10	......	....
.768	.775	.880	.807	N	NE	NE	35	25	12	22.3	N. 23 E.	10	10	10	......	....
.763	.880	.768	.805	W	SW	W	12	4	12	9.0	S. 84 W.	10	10	10	......	....
.703	.797	.794	.765	SW	W	W	4	35	45	27.7	S. 88 W.	10	10	10	......	....
.890	.800	.896	.862	SW	S	SW	25	35	25	26.2	S. 27 W.	10	10	10	......	....
.799	.817	.829	.818	....	....	....	....	....	....	3.8	N. 78 W.	9.6	9.4	9.9	......	3.08

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April 1	29.722	29.505	29.328	29.518	13	22	25	15	25	27	22.3	31	14	.056	.084	.112	.084
2	28.843	29.042	29.030	28.572	40	35	33	42	38	35	38.3	43	30	.221	.165	.162	.182
3	29.650	29.903	29.936	29.829	29	31	28	31	33	30	31.3	37	26	.137	.151	.130	.139
4	30.158	30.172	29.903	30.078	26	29	25	28	31	27	28.7	34	26	.117	.137	.112	.122
5	29.793	29.610	29.472	29.625	31	38	40	32	40	42	38.0	45	31	.162	.203	.221	.195
6	29.515	29.553	29.560	29.542	34	39	33	36	41	35	37.3	43	30	.170	.212	.162	.18
7	29.796	29.917	29.929	29.881	25	30	28	28	31	30	29.7	33	25	.100	.155	.130	.12
8	30.047	30.026	29.904	29.992	28	34	31	30	36	34	33.3	37	28	.130	.170	.139	.146
9	30.043	30.063	29.931	30.012	30	41	34	32	43	37	37.3	47	29	.144	.231	.157	.177
10	29.854	29.681	29.545	29.693	34	49	51	36	51	54	47.0	55	32	.170	.321	.335	.275
11	29.549	29.510	29.341	29.467	57	66	59	59	69	62	63.3	71	45	.439	.599	.460	.499
12	29.628	29.782	29.753	29.721	41	37	32	43	39	35	39.0	46	33	.231	.194	.142	.189
13	29.922	29.945	29.838	29.902	33	36	31	36	38	34	36.0	40	31	.149	.186	.139	.158
14	29.967	29.899	29.711	29.859	30	39	34	32	42	37	37.0	42	30	.144	.199	.157	.167
15	29.775	29.832	29.655	29.761	36	44	45	38	46	47	43.7	50	33	.186	.262	.273	.240
16	29.746	29.762	29.610	29.706	35	39	38	38	41	40	39.7	48	35	.165	.212	.203	.193
17	29.693	29.723	29.757	29.724	37	40	38	39	43	40	40.7	43	37	.194	.208	.203	.202
18	29.822	29.825	29.657	29.768	39	41	39	41	44	41	42.0	44	39	.212	.218	.212	.214
19	29.787	29.731	29.658	29.725	38	41	42	40	43	44	42.3	46	31	.203	.231	.241	.225
20	29.734	29.901	29.983	29.873	41	42	38	42	44	41	42.3	48	37	.244	.241	.190	.225
21	30.069	30.113	29.929	30.037	39	42	43	40	44	45	43.0	45	36	.225	.241	.251	.239
22	29.973	29.904	29.721	29.866	44	42	44	45	44	46	45.0	51	39	.275	.241	.262	.259
23	29.749	29.633	29.508	29.630	43	45	43	45	47	44	45.3	51	39	.251	.273	.264	.263
24	29.514	29.461	29.570	29.565	39	55	41	41	58	43	47.3	58	38	.212	.393	.231	.245
25	29.748	29.610	29.695	29.684	32	42	39	35	45	41	40.3	47	34	.142	.228	.212	.194
26	30.002	29.933	29.733	29.889	35	47	46	38	50	48	45.3	51	37	.165	.283	.284	.244
27	29.857	29.881	29.573	29.770	39	52	50	41	55	52	49.3	60	36	.212	.349	.334	.298
28	29.589	29.679	29.478	29.582	45	52	44	47	55	46	49.3	57	41	.273	.349	.262	.295
29	29.669	29.468	29.475	29.537	41	45	41	43	48	43	44.7	60	40	.231	.260	.231	.241
30	29.717	29.711	29.560	29.663	40	50	45	42	57	47	46.7	53	39	.221	.348	.273	.281
Means.....	29.764	29.759	29.658	29.727	35.8	41.5	38.7	37.8	43.8	40.9	40.8	....	....	.193	.245	.216	.216
May 1	29.724	29.630	29.550	29.635	44	65	53	46	67	55	56.0	67	41	.262	.591	.376	.409
2	29.656	29.723	29.653	29.677	47	45	43	50	47	45	47.3	52	43	.244	.273	.251	.256
3	29.806	29.871	29.613	29.763	40	41	43	42	43	45	43.3	46	39	.221	.231	.251	.234
4	29.608	29.673	29.555	29.612	38	42	41	40	44	43	42.3	48	38	.164	.241	.231	.212
5	29.676	29.678	29.574	29.643	38	34	34	40	37	36	37.7	43	34	.164	.157	.162	.161
6	29.762	29.713	29.605	29.693	37	39	38	39	41	40	40.0	42	37	.191	190	.164	.18
7	29.698	29.669	29.573	29.647	38	45	40	40	47	42	43.0	47	37	.164	.273	.221	.219
8	29.719	29.764	29.555	29.679	38	49	45	40	52	47	46.3	54	37	.164	.318	.972	.248
9	29.688	29.614	29.530	29.611	45	63	55	46	66	57	56.3	67	42	.286	.536	.407	.410
10	29.694	29.675	29.550	29.640	51	64	63	54	67	66	62.3	67	50	.335	.556	.536	.47
11	29.668	29.764	29.757	29.730	53	49	48	56	51	50	52.3	66	46	.363	.321	.308	.331
12	29.740	29.739	29.673	29.717	44	51	47	47	52	50	49.7	52	44	.249	.362	.244	.285
13	29.777	29.706	29.584	29.689	47	53	45	49	55	47	50.3	57	45	.297	.376	.273	315
14	29.629	29.757	29.616	29.667	43	41	44	45	44	47	45.3	49	41	.251	.218	.249	.23
15	29.770	29.747	29.557	29.691	41	51	49	43	54	51	49.3	57	40	.231	.335	.321	.29
16	29.467	29.528	29.411	29.469	48	61	53	51	64	55	56.7	65	45	.296	.497	.376	.39
17	29.599	29.581	29.535	29.572	44	53	45	46	56	48	50.0	57	43	.262	.363	.393	.339
18	29.694	29.754	29.705	29.718	43	52	48	45	54	51	50.0	55	43	.251	.362	.296	.30
19	29.817	29.820	29.641	29.759	47	65	57	48	68	60	58.7	68	42	.310	.577	.426	.438
20	29.723	29.784	29.621	29.716	55	62	61	58	65	64	62.3	66	55	.393	.516	.497	.469
21	29.927	29.959	29.871	29.919	58	74	64	61	77	67	68.3	77	57	.448	.799	.556	.59
22	29.985	29.959	29.776	29.907	58	75	68	61	78	71	70.0	82	55	.443	.827	.644	.63
23	29.805	29.754	29.551	29.703	58	66	62	60	69	64	64.3	81	54	.456	.599	.529	.52
24	29.657	29.629	29.496	29.594	58	67	62	60	70	65	65.0	75	56	.456	.622	.516	.531
25	29.633	29.704	29.621	29.653	53	50	46	56	51	48	51.7	65	48	.363	.348	.284	.33
26	29.776	29.821	29.734	29.777	45	50	47	47	52	49	49.3	57	45	.273	.334	.297	.301
27	29.925	29.890	29.784	29.866	50	58	51	52	60	54	55.3	61	44	.334	.456	.335	.375
28	29.865	29.772	29.608	29.748	50	65	61	52	68	63	61.0	73	47	.334	.577	.510	.474
29	29.660	29.715	29.499	29.625	58	62	61	60	65	63	62.7	67	55	.456	.516	.510	.494
30	29.335	29.251	29.108	29.231	58	66	64	60	69	46	58.3	70	56	.456	.599	.569	.541
31	29.144	29.136	29.037	29.106	62	60	60	64	63	62	63.0	69	60	.529	.478	.491	.499
Means	29.697	29.704	29.595	29.660	48.0	55.4	51.5	50.2	57.3	53.2	53.8	....	....	.311	.401	.371	.361

of the north and northwestern lakes, at Fort Niagara, New York.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.			
.648	.622	.761	.677	W	S	SW	25	12	45	23.8	S. 52 W	10	10	10	......	....
.829	.719	.797	.782	SW	W	W	60	45	60	51.0	S. 74 W	10	10	10	......	....
.788	.800	.782	.790	N	NW	W	4	12	60	23.5	N. 80 W.	10	7	8	......	....
.768	.788	.761	.772	W	N	NE	60	25	35	20.3	N. 36 W.	7	8	9	......	....
.896	.820	.829	.848	N	W	W	35	25	4	15.2	N. 40 W.	7	10	10	......	....
.802	.824	.797	.808	W	W	W	25	25	35	28.3	West	10	10	10	......	.18
.655	.893	.782	.777	NE	N	N	60	45	35	43.0	N. 19 E.	10	10	10	......	....
.782	.802	.712	.765	NE	NW	S	12	4	25	4.9	S. 23 E.	10	10	10	......	....
.794	.833	.712	.779	W	W	SW	12	25	35	22.0	S. 68 W.	7	6	10	......	....
.802	.859	.802	.821	S	S	SW	25	4	12	12.8	S. 13 W.	10	10	10	......	....
.878	.846	.828	.851	S	S	W	45	60	25	36.7	S. 13 W.	10	10	10	......	.42
.833	.816	.698	.782	W	NW	W	25	12	45	26.3	N. 84 W	8	9	10	......	....
.705	.811	.712	.743	N	N	W	25	4	4	9.7	N. 8 W.	7	6	10	......	....
.794	.744	.712	.750	S	NE	NE	2	25	35	19.3	N. 46 E.	6	9	10	......	....
.811	.843	.847	.834	NE	S	S	12	25	4	7.5	S. 22 E.	10	10	10	......	.14
.719	.824	.820	.788	NE	NE	NE	35	45	60	46.7	N. 45 E.	10	10	10	......	.20
.816	.750	.820	.795	NW	NW	NE	12	4	4	5.5	N. 31 W.	10	10	10	......	.10
.824	.756	.824	.801	S	NE	NE	2	2	4	1.6	N. 62 E.	10	10	10	......	....
.820	.833	.836	.830	NE	NE	NE	4	35	12	17.0	N. 45 E.	10	7	10	......	....
.914	.836	.738	.829	NE	E	NE	25	35	45	32.7	N. 60 E.	10	10	10	......	.78
.910	.836	.840	.862	W	NE	NE	2	35	60	31.3	N. 44 E.	10	10	10	......	....
.920	.836	.843	.866	S	E	SE	2	35	25	18.7	S. 70 E.	7	8	10	......	....
.840	.847	.918	.868	S	NE	W	4	25	4	6.5	N. 45 E.	7	10	10	......	....
.824	.816	.833	.824	W	W	W	2	12	45	19.7	West	7	5	10	......	....
.698	.762	.824	.761	N	W	W	60	35	60	37.7	N. 58 W.	6	7	10	......	....
.719	.786	.850	.785	NE	W	W	45	4	2	13.7	N. 29 E.	6	2	9	......	....
.824	.805	.861	.830	SW	W	S	4	2	25	9.3	S. 10 W.	8	7	10	......	....
.847	.805	.843	.832	S	S	NE	2	4	25	7.0	N. 56 E.	8	10	10	......	....
.833	.777	.833	.814	NE	NE	E	35	25	2	20.3	N. 46 E.	10	8	9	......	....
.829	.929	.847	.868	W	NE	S	2	12	4	2.6	N. 55 E.	10	8	10	......	....
.804	.807	.802	.804	....	....	....	....	...	....	5.0	N. 29 W.	8.7	8.5	9.8	......	1.82
.843	.893	.869	.868	S	W	S	12	12	4	6.7	S. 37 W.	10	7	8	......	....
.606	.847	.840	.764	S	NE	NE	2	25	12	12.0	N. 47 E.	10	10	10	......	....
.829	.833	.840	.834	NE	NE	NE	45	60	12	39.0	N. 45 E.	10	10	8	......	....
.587	.836	.833	.752	NE	NE	NE	35	25	12	24.0	N. 45 E.	10	10	10	......	....
.587	.712	.797	.699	NE	NE	NE	60	60	75	65.0	N. 45 E.	10	10	10	......	.87
.816	.738	.587	.714	NE	NE	NE	45	35	35	38.3	N. 45 E.	10	10	10	......	.16
.587	.847	.829	.754	NE	NE	N	4	2	12	5.7	N. 15 E.	10	7	10	......	....
.587	.794	.847	.713	SW	N	NE	2	2	2	0.7	North	10	8	10	......	....
.921	.838	.874	.878	S	SW	SW	2	4	25	10.0	S. 42 W	8	10	10	......	....
.802	.841	.838	.827	S	S	S	12	35	2	16.3	South	9	8	10	......	....
.809	.859	.856	.841	S	N	N	2	35	12	15.0	North	10	10	10	......	.10
.772	.930	606	.770	W	NW	W	4	2	25	10.0	N. 87 W.	10	10	10	......	.08
.853	.869	.847	.856	SW	N	NE	4	2	12	3.2	N. 37 E.	10	7	10	......	.38
.840	.756	.772	.789	N	NW	W	25	35	4	19.0	N. 30 W.	10	10	10	......	.50
.833	.802	.859	.831	W	SW	S	4	12	25	12.0	S. 20 W.	8	7	10	......	....
.790	.833	.869	.831	S	SW	S	12	35	12	18.0	S. 27 W	10	8	10	......	....
.843	.809	.816	.823	W	W	W	25	4	4	11.0	West	6	10	10	......	....
.840	.867	.790	.832	W	W	W	25	35	12	24.0	West	10	10	10	......	....
.926	.843	.822	.864	SW	S	S	12	35	25	23.0	S. 7 W	7	8	10	......	....
.816	.836	.833	.829	S	S	S	25	35	25	28.3	South	10	10	10	......	....
.825	.862	.841	.843	S	W	S	12	4	12	8.3	S. 10 W.	7	8	10	......	....
.825	.863	.850	.846	S	S	S	2	2	12	5.3	South	7	5	10	......	....
.880	.846	.888	.871	S	NW	SW	4	2	4	2.3	S. 38 W	8	9	10	......	....
.860	.848	.836	.855	NE	W	S	4	4	25	7.4	S. 3 W.	7	8	9	......	....
.809	.929	.850	.863	N	NE	NE	25	45	60	41.3	N. 37 E.	7	8	10	......	....
.847	.861	.853	.854	NE	NE	NE	25	35	45	35.0	N. 45 E.	9	8	10	......	....
.861	.880	.802	.848	W	N	NE	2	4	2	1.8	N. 7 W.	7	8	10	......	....
.861	.843	.886	.863	W	W	S	2	2	4	1.9	S. 45 W.	10	7	9	......	....
.880	.836	.886	.867	SW	N	NE	2	12	4	4.5	N. 6 E.	10	10	10	......	....
.880	.846	.891	.872	N	SW	S	2	25	4	8.8	S. 41 W.	10	10	10	......	....
.888	.831	.884	.868	W	W	S	12	23	25	15.0	S. 56 W.	10	10	10	......	.70
.804	.839	.828	.824	....	....	....	....	...	....	3.6	N. 42 E.	8.9	9.1	9.7	......	2.79

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	29.104	29.189	29.148	29.147	59	57	50	61	60	52	57.7	63	51	.473	.496	.334	.411
2	29.741	29.449	26.451	29.547	50	53	50	52	56	52	53.3	57	49	.334	.363	.334	.344
3	29.653	29.690	29.571	29 638	47	57	52	49	60	54	54.3	62	47	.297	.426	.362	.362
4	29.797	29.649	29.578	29.675	46	62	55	48	65	57	56.7	67	45	.284	.516	.407	.402
5	29.650	29.687	29.648	29.662	53	58	50	56	60	52	56.0	62	51	.363	.456	.334	.384
6	26.856	29.935	29.829	29.873	48	55	50	50	58	53	53.7	61	48	.309	.393	.321	.341
7	29.940	29.865	29.879	29.895	48	51	50	50	52	51	51.0	61	48	.309	.348	.348	.332
8	29.861	29.813	29.659	29.778	50	58	55	52	61	58	57.0	63	50	.334	.443	.393	.390
9	29.733	29.664	29.570	29.656	54	62	60	57	65	62	61.3	66	51	.378	.516	.491	.462
10	29.697	29.657	29.521	29.625	56	67	62	59	70	65	64.7	72	56	.409	.622	.516	.51
11	29.519	29.566	29.531	29.539	59	62	58	61	64	60	61.7	66	57	.473	.529	.456	.486
12	29.539	29.670	29.666	29.625	57	60	58	59	62	60	60.3	62	57	.439	.491	.456	.462
13	29.786	29.857	29.759	29.801	57	63	62	60	66	65	63.7	71	56	.426	.536	.516	.493
14	29.854	29.834	29.608	29.765	60	73	70	62	75	72	69.7	78	58	.491	.784	.706	.660
15	29.601	29.671	29.623	29.632	66	72	58	71	75	60	68.7	78	58	.572	.744	.456	591
16	29.885	29.747	29.658	29.763	53	56	56	56	59	58	57.7	61	53	.363	.409	.422	.398
17	29.454	29.439	29.355	29.416	60	60	55	63	62	57	60.7	70	56	.478	.491	.407	.459
18	29.419	29.456	29.325	29.400	53	65	62	56	68	65	63.0	71	53	.363	.577	.516	485
19	29.436	29.474	29.425	29.445	55	64	63	57	67	65	63.0	70	57	.407	.556	.549	.504
20	29.569	29.608	29.398	29.525	58	61	59	60	64	61	61.7	65	55	.456	.497	.473	.475
21	29.606	29.624	29.578	29.603	55	61	56	58	64	58	56.7	64	54	.393	.497	.422	.437
22	29.792	29.569	29.561	29.641	55	59	57	57	62	59	59.3	62	53	407	.460	.439	.435
23	29.720	29.766	29.694	29.727	53	61	57	55	64	60	59.7	65	52	.376	.497	.426	433
24	29.890	29.914	29.856	29.887	54	60	61	56	63	63	60.7	67	54	.391	.478	.510	.460
25	29.967	29.934	29.766	29.889	55	64	62	57	67	65	63.0	67	53	.407	.556	.516	.493
26	29.895	29.860	29.758	29.838	60	65	65	62	68	67	65.7	68	57	.491	.577	.591	.553
27	29.850	29.817	29.671	29.779	63	67	62	65	70	65	66.7	71	61	.549	.622	.516	562
28	29.754	29.714	29.641	29.703	64	68	67	66	71	70	69.0	73	60	.569	.644	.622	612
29	29.704	29.641	29.506	29 617	65	70	71	67	72	74	71.0	77	62	.591	.706	.718	.668
30	29.591	29.655	29.518	29.588	71	78	71	74	80	74	76.0	82	70	.718	.931	.718	.789
Means.....	29.692	29.680	29.591	29.654	56.3	62.3	58.8	58.5	65.0	61.1	61.5	....	....	.428	.536	.476	.480

of the north and northwestern lakes, at Fort Niagara, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.882	.822	.861	.855	S.	S.	W.	75	60	35	46.3	S. 15 W.	10	10	10	......	....
.861	.809	.861	.844	W.	W.	W.	35	25	35	31.7	West.	10	10	10	......	....
.853	.822	.867	.847	NW	W.	SW.	12	2	4	5.0	N. 69 W.	7	10	10	......	....
.850	.836	.874	.853	S.	W.	W.	4	35	12	15.7	S. 85 W.	6	10	10	......	....
.809	.880	.861	.850	SW.	NW.	NW.	4	2	25	9.0	N. 53 W.	10	10	10	......	.26
.856	.816	.798	.823	NW.	W.	NW.	12	4	45	20.0	N. 48 W.	10	7	10	......	....
.856	.929	.929	.905	NW.	W.	N.	60	35	45	39.0	N. 41 W.	8	10	10	......	....
.861	.825	.816	.834	N.	W.	W.	35	25	35	23.3	N. 60 W.	10	7	10	......	....
.812	.836	.884	.841	W.	W.	W.	45	25	12	27.3	West.	6	8	10	......	....
.819	.848	.836	.834	SW.	W.	S.	12	2	4	5.4	S. 40 W	7	8	10	......	....
.882	.888	.880	.883	S.	NW.	W.	2	2	2	1.2	S. 80 W.	10	10	10	......	....
.878	.884	.880	.881	W.	W.	NW.	4	2	4	3.1	N. 72 W.	10	10	10	......	....
.822	.838	.836	.832	W.	W.	W.	2	2	2	2.0	West.	7	10	10	......	....
.884	.904	.900	.896	S.	W.	SW.	4	4	25	10.3	S. 45 W.	7	8	10	......	....
.754	.858	.880	.831	W.	W.	N.	35	12	60	25.7	N. 38 W.	7	8	10	......	....
.809	.819	.876	.835	NE.	NW.	E.	25	4	2	8.8	N. 38 E.	10	7	10	......	....
.831	.884	.874	.863	NW.	NE.	N.	2	12	25	11.3	N. 13 E.	8	10	10	......	....
.809	.813	.836	.829	SW.	W.	S.	4	2	2	2.3	S. 45 W.	10	10	10	......	....
.874	.841	.890	.868	SW.	N.	S.	2	12	2	2.9	N. 11 W	8	9	10	......	....
.880	.833	.882	.865	S.	SW.	S.	2	2	2	1.8	S. 15 W.	10	10	10	......	.40
.816	.893	.876	.862	S	S	S.	12	4	25	13.7	South.	10	8	10	......	....
.874	.828	.878	.860	S	S	S.	12	25	12	16.3	South.	10	10	10	......	....
.869	.893	.822	.861	SW.	W.	W.	25	35	12	22.5	S. 75 W.	8	9	10	......	....
.872	.831	.886	.863	W.	NW.	W.	4	2	2	2.5	N. 79 W.	7	8	9	......	....
.874	.841	.836	.850	SW.	N.	S.	2	25	2	7.3	N. 4 W.	7	6	10	......	....
.884	.843	.893	.873	W	NE.	SW.	2	25	4	6.3	N. 41 E.	7	6	8	......	....
.890	.848	.836	.858	SE	NE.	NE.	2	25	4	9.7	N. 49 E.	6	5	9	......	....
.891	.850	.848	.863	S.	NE.	S.	2	35	4	10.3	N. 53 E.	4	6	8	......	....
.893	.900	.856	.883	S.	NE.	SE.	4	35	45	19.4	S. 79 E.	5	9	10	......	....
.856	.910	.856	.874	S.	SW.	NW.	45	12	2	12.7	S. 11 E.	6	8	10	......	.10
.853	.855	.863	.857	....	....	....	....	....	....	5.6	N. 85 W.	8.0	8.9	9.8	......	.76

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
					°	°	°	°	°	°	°	°	°				
1862.																	
August 1	29.758	29.718	29.723	29.736	63	70	71	67	80	76	74.3	81	55	.522	.598	691	.604
2	29.775	29.752	29.678	29.735	62	71	70	65	79	74	72.7	82	52	.516	.65	.679	.615
3	29.729	29.657	29.590	29.659	65	73	71	70	86	78	78.0	86	59	.550	.636	.664	.617
4	29.643	29.651	29 672	29.655	68	76	75	72	87	89	79.7	90	64	631	.748	.800	.726
5	29 628	29.529	29.658	29 605	73	71	69	75	81	74	76.7	82	67	.784	.624	.641	.68
6	29 845	29 880	29.861	29.862	62	66	66	64	76	69	69.7	78	54	.529	.762	599	630
7	29.885	29.793	29.677	29.785	62	70	74	64	75	78	72.3	80	55	.529	.666	.785	.660
8	29.622	29.574	29.492	29.562	67	77	75	81	79	81	80.3	87	69	.608	.900	.787	.763
9	29.428	29.389	29.495	29.437	75	76	65	79	81	72	77.3	84	65	.814	.825	524	.722
10	29 623	29.699	29 673	29.665	65	67	67	69	80	72	73.7	83	60	.564	.487	595	.549
11	29.688	29.581	29.502	29.590	60	75	73	63	88	81	77.3	89	53	.478	.692	.703	.624
12	29.711	29.727	29.817	29.752	65	64	60	69	77	67	71.0	87	53	.564	.422	.425	.470
13	29.915	29.877	29.847	29.880	57	61	63	64	77	67	69.3	79	55	.373	.323	.522	.406
14	29 690	29.593	29.551	29.611	58	68	63	62	72	66	66.7	74	51	.429	.631	.536	.53
15	29.584	29.709	29.742	29.678	61	56	55	64	69	65	66.0	69	55	.497	.276	.300	.35
16	29.931	29.977	29.955	29 955	50	55	55	57	66	60	61.0	69	48	.268	.287	367	.307
17	30.054	29.870	29.859	29.934	50	63	63	53	76	66	65.0	79	42	.321	.402	.536	.419
18	29.835	29.690	29.729	29.751	55	65	65	60	75	70	68 3	80	51	.367	.484	.550	.467
19	29.753	29.753	29.699	29.735	57	67	66	61	75	70	68.7	80	52	.412	.554	.586	.517
20	29.767	29.772	29.756	29.765	58	68	67	63	77	71	70.3	82	53	.416	.564	.608	.52
21	29.827	29.767	29.641	29.745	55	70	68	63	77	73	71.0	81	53	.416	.639	.618	.55
22	29 527	29.467	29.472	29.489	68	73	73	71	79	77	75.7	80	63	.644	.730	.757	.710
23	29.641	29 696	29 862	29.733	62	64	55	66	69	65	66.7	77	57	.502	.529	.300	.444
24	30.074	30.057	29.955	30.028	48	55	55	53	66	60	59.7	67	45	.269	.287	.367	.30
25	29.860	29.765	29.646	29.757	54	68	64	58	78	71	69.0	82	44	.363	.550	.503	.47
26	29.669	29 589	29.558	29.605	62	73	71	66	85	75	75.3	85	58	502	.650	.704	.61
27	29.628	29.590	29.531	29.583	68	70	67	71	74	70	71.7	76	62	.644	.679	.622	64
28	29.468	29.445	29.433	29.455	65	69	65	67	72	69	69.3	75	60	.591	.668	.564	60
29	29.665	29 709	29.817	29 730	58	58	53	64	69	63	65.3	69	55	.403	.336	.270	.336
30	30.020	29.956	29.881	29.952	49	63	55	51	70	58	59.7	72	41	.321	.482	.393	.399
31	29.831	29.647	29.493	29.657	52	65	67	54	77	73	68.0	78	44	.362	.457	.581	.467
Means.....	29.748	29.706	29.686	29.712	60.5	67.3	65.3	64.7	76.4	70.6	70.6	....	....	.490	.566	.567	.541
Sept. 1	29.268	29.168	29.287	29.241	67	68	55	71	70	60	67.0	73	53	.608	.658	367	.544
2	29.608	29.655	...	29.631	44	41	...	48	51	....	49.5	...	....	.236	.196	...	.216
3	29.856	29 849	29.855	29.853	43	58	56	45	65	69	59.7	68	34	.251	.387	.276	.305
4	29.825	29.794	29.813	29.810	56	73	65	60	82	72	71.3	83	46	.396	.390	.524	437
5	29.849	29.746	29 650	29 758	61	75	72	66	83	77	75 3	89	57	.470	.760	.718	.649
6	29.673	29.639	29.641	29.651	64	72	70	71	80	73	74.7	80	62	.503	.677	.693	.624
7	29.598	29.604	29.607	29 603	66	76	73	71	83	78	77.3	83	64	.572	.802	.744	.706
8	29.598	29 575	29.727	29 633	66	68	62	71	78	67	72.0	81	58	.572	550	.489	.537
9	29.961	29.961	29.938	29.950	56	58	56	58	68	59	61.7	72	48	.422	.330	.409	.394
10	29.987	29.981	29.889	29.936	50	66	53	52	73	66	63.7	74	43	.334	.545	.231	.370
11	29.877	29.769	29.688	29.778	63	72	67	67	84	74	75.0	85	57	.522	.623	.568	.571
12	29 656	29.719	29 881	29.752	67	62	54	71	65	58	64.7	74	49	.608	.516	.365	.496
13	30 080	30.056	30.034	30.057	47	50	51	51	56	57	54.7	57	42	.270	.284	.295	.29
14	30.010	29.932	*29.916	29.953	45	56	54	47	63	56	55.3	67	35	.273	.356	.391	340
15	29.907	29.779	29.813	29.833	51	62	58	52	69	61	60.7	70	36	.361	.462	.443	.422
16	29 955	29.919	29.838	29.904	58	58	57	60	65	59	61.3	66	52	.456	389	.439	.42
17	29.792	29.743	29.581	29.704	52	67	65	54	72	63	65.0	75	43	.362	.595	.564	507
18	29.463	29.557	29 649	29.556	68	69	65	73	77	70	73.3	78	61	.618	.611	.550	58
19	29 790	29.823	29.845	29 819	58	60	57	62	67	60	63.0	68	52	.429	.425	.426	.427
20	29.881	29.811	29.803	29 831	53	63	58	58	69	61	62.7	71	45	422	.495	.443	.453
21	29.975	29.974	29 943	29 964	58	61	58	60	67	61	62.7	68	47	.458	.457	.443	.452
22	29 925	29 872	29.821	29 873	57	64	64	60	76	69	68.3	80	47	426	436	.529	.464
23	29.795	29.672	29.541	29.669	58	66	63	64	80	69	71.0	82	53	.403	452	.495	.450
24	29.645	29 753	....	29 694	56	53	...	60	61	...	60.5	..	....	.39.	297	...	346
25	29.853	29.792	29.732	29.792	43	56	50	46	65	54	55.0	68	35	.23	330	.308	.297
26	29.84	29.781	29.751	29 792	48	60	54	50	69	57	58.7	70	38	.309	.398	.378	.36
27	29.820	29.761	29.683	29.755	49	63	57	51	68	61	60.0	69	44	.321	.509	.412	414
28	29 726	29.623	29.6 0	29 653	54	64	58	56	72	62	63.3	73	47	.345	.489	.429	41
29	29 654	29.641	29.695	29.663	59	64	55	61	69	60	63.3	69	49	.473	.529	.367	.456
30	29 806	29.891	29.917	29.872	51	49	49	55	53	52	53.3	59	44	.321	.995	.308	.30
Means....	29.787	29.760	29.755	29.766	55.6	62.6	59.5	59.0	70.0	64.0	64.1	....	....	.412	475	.451	.44

of the north and northwestern lakes, at Charlotte, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.790	.585	.771	.715	NW.....	N.	S.	4	12	2	4 3	N. 12 W.	2	5	5	......	....
.836	.657	.810	.768	W.SW..	N.	S.	4	12	2	3 1	N. 24 W.	8	9	0	......	....
.751	.513	.693	.652	S........	S.......	S. SE..	25	12	12	16.2	S. 5 E..	6	7	0	......	....
.804	.584	.782	.723	S........	N.	SE.. ..	25	12	2	4.8	S. 6 E.	3	6	10	......	....
.904	.590	.764	.753	S. SW...	N.	W.NW	12	25	4	5.8	N. 28 W.	8	4	3	......	....
.888	.613	.816	.782	NW.....	N.	S......	4	12	4	3.8	N. 14 W.	9	3	0	......	....
.888	.768	.819	.825	S. SW...	SE.. ..	SE.. ..	4	12	2	5.3	S. 32 E..	9	7	7	......	....
.802	.909	.744	.818	W.SW..	SW...	S......	12	12	4	8.7	S. 49 W.	10	8	2	......	.01
.822	.784	.688	.765	W.SW.	W.. ..	N.	25	35	25	20.0	N. 75 W.	7	6	6	......	.69
.796	.476	.758	.677	NE......	NE....	S......	25	12	2	12 0	N. 47 E..	4	4	0	......	.19
.831	.523	.665	.673	SW....	W.SW	S......	12	25	12	14.6	S. 46 W.	3	7	3	......	....
.796	.456	.642	.631	NW.....	NW...	NW.. .	12	35	12	19.7	N. 45 W.	3	3	0	......	....
.625	.349	.790	.586	NE......	NE....	S......	12	12	2	7.7	N. 49 E..	10	4	3	......	....
.772	.804	.838	.805	S........	W	N.	35	4	2	11.0	S. 7 W.	10	10	10	......	....
.833	.391	.487	.570	W......	W. NW	NW...	35	35	25	30.3	N. 70 W.	5	2	9	......	.31
.577	.450	.708	.578	N. NE...	NE....	S......	45	25	4	21.7	N. 32 E..	4	5	0	......	.15
.798	.448	.838	.695	S. SW...	S. SE..	S..... .	25	4	2	10.0	S. 16 W.	10	0	7	......	....
.708	.558	.751	.672	S. SW...	N.	S......	35	12	2	8.7	S. 31 W	9	4	2	......	....
.769	.639	.799	.736	S........	S.	S......	2	12	4	6.0	South....	10	3	0	......	....
.723	.608	.802	.711	S........	NE.. ..	S......	12	4	2	3 8	S. 14 E..	10	3	1	......	....
.723	.689	.761	.724	S........	N. NE.	NE. ..	12	25	2	5.7	N. 41 E..	10	6	10	....,	
.830	.738	.817	.802	S........	SW....	S.	25	35	2	19 2	S. 25 W.	9	5	8	......	.08
.786	.747	.487	.673	NW.	N.	N.	12	45	45	33.0	N. 5 W.	2	9	0	......	.10
.667	.450	.708	.608	E.... ...	E. NE.	E.	35	35	25	31.0	N. 82 E..	4	0	0	......	....
.756	.574	.663	.631	S.	NE....	S.	25	12	4	7.3	S. 23 E..	0	5	3	......	....
.786	.540	.812	.713	W.SW..	N.	S......	4	12	4	2.5	N. 30 W.	6	7	0	......	....
.850	.810	.848	.836	NW.	SW. .	S......	4	12	4	5.0	S. 49 W	10	9	10	......	..
.893	.852	.796	.847	SE.. ...	NW. ..	NW. ..	4	12	12	6.7	N. 45 W.	10	7	0	......	.29
.675	.475	.470	.540	N. NE...	W.NW.	N.	45	45	60	41.7	N. 11 W.	5	3	3	......	.20
.859	.658	.816	.778	S. SW...	E. SE..	S.	12	12	2	6.3	S. 20 E..	6	2	0	......	....
.867	.493	.716	.692	S........	E	S.	25	25	45	25.0	S. 20 E.	0	3	10	......	....
.788	.604	.738	.709	....	....	....	....	....	....	1.6	N. 55 W.	6.5	5.0	3.6	......	2.02
.802	.898	.708	.803	S........	S. SW.	NW. ..	25	35	35	16.7	S. 50 W	9	0	9	......	.68
.704	.525	......	.614	N.	N. NW.	....	45	45	...	44.3	N. 11 W.	10	9	....	......	.49
.840	.631	.391	.621	NW.....	N. NE	NE....	12	12	2	7.0	N. 7 W	4	4	0	......	....
.765	.632	.668	.688	S........	W.SW	S......	35	25	4	18.0	S. 26 W.	8	0	3	......	....
.735	.673	.774	.727	S........	W.SW	S......	4	12	12	7.7	S. 29 W	5	4	0	......	....
.663	.661	.854	.726	S........	S.. ...	S. SE..	25	4	2	10.0	S. 2 E..	6	9	10	......	....
.754	.711	.776	.747	S... ...	W. SW.	S......	12	12	4	7.7	S. 29 W.	10	10	10	......	.02
.754	.574	.740	.629	S........	W.NW	S......	25	35	2	11.7	S. 67 W.	7	6	3	......	....
.876	.511	.819	.735	NW... .	N. NE.	S......	4	25	4	7.7	N. 17 E..	8	2	0	......	....
.861	.672	.361	.631	NE	E......	S......	2	35	2	12.1	S. 89 E..	10	0	0	......	...
.790	.535	.677	.667	S........	S. SE..	S. SE..	25	4	25	17.7	S. 12 E.	0	3	0	......	....
.802	.836	.756	.798	S........	NW. ..	N.	25	12	12	3.2	S. 62 W.	10	10	0	......	....
.722	.627	.634	.661	NE	NE....	NE....	60	45	45	50.0	N. 45 E..	10	9	7	......	.27
.847	.619	.872	.779	E.SE....	N.	W.. ..	12	25	4	7.2	N. 19 E.	7	4	0	......	....
.930	.653	.825	.803	S..	E. NE.	NE....	2	12	25	11.7	N. 55 E.	2	10	10	......	....
.880	.631	.878	.796	E NE...	E. NE.	S......	25	35	4	19.7	N. 71 E..	9	7	0	......	.17
.867	.758	.796	.807	E.	E SE..	SE.. ..	4	4	25	10.7	S. 53 E.	7	10	0	......	....
.761	.648	.751	.720	S........	W SW.	S......	45	45	2	25.5	S. 33 W.	7	5	1	......	....
.722	.642	822	.729	NW.	NW...	SE.. ..	12	25	2	12.3	N. 45 W	10	8	0	......	....
.876	.700	.825	.800	W. SW..	SW....	N.	4	4	2	2.3	S. 70 W.	8	5	0	......	....
.880	.690	.825	.798	W.NW..	NE. ...	SE.. ..	4	25	4	7.7	N. 46 E..	7	2	0	......	....
.822	.486	.747	.685	S........	S.	S......	25	35	4	21.3	South ...	3	3	0	......	....
.675	.441	.700	.605	S. SW...	S. SW..	S......	35	12	12	19.3	S. 18 W.	2	3	10	......	....
.765	.553	......	.659	N.	N.	....	45	25	...	35.0	North ...	10	4	....	......	.12
.767	.535	.738	.680	S........	E.	NW. ..	25	12	12	5.7	S. 12 E..	10	1	2	......	....
.856	.564	.812	.744	S........	NE....	S......	12	12	4	3.8	S. 49 E.	10	2	0	......	....
.859	.743	.769	.790	S........	E. ...	S......	12	12	2	6.3	S. 41 E.	0	7	2	......	....
.747	.624	.772	.714	S.	E. SE..	S......	25	12	4	11.8	S. 19 E.	7	2	0	......	....
.882	.747	708	.779	S........	N.	NE....	2	12	45	17.5	N. 37 E..	7	7	10	......	....
.743	.733	.794	.757	E. NE. ..	E. NE.	E.... .	35	35	12	27.0	N. 71 E..	10	10	1C	......	....
.798	.642	.707	.721	....	....	....	..	....	....	2.3	S. 83 E..	7.3	5.2	3.1	......	1.75

O—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
October 1	29.885	29.896	29.796	29.836	47	53	54	49	56	56	53.7	56	49	.297	.363	.391	.350
2	29.803	29.718	29.767	29.763	58	68	65	61	73	67	67.0	73	46	.443	.618	.591	.550
3	29.842	29.737	29.679	29.753	63	64	63	65	66	66	65.7	67	56	.549	.569	.536	.551
4	29.573	29.400	29.674	29.549	67	70	53	69	78	61	69.3	78	52	.635	.625	.297	.519
5	29.990	30.034	30.005	30.009	47	48	45	51	58	49	52.7	59	42	.270	.203	.247	.240
6	29.944	29.653	29.434	29.677	39	58	57	42	65	65	57.3	65	30	.199	.389	.359	.316
7	29.533	29.502	29.470	29.502	65	72	68	69	81	74	74.7	81	55	.564	.663	.604	.610
8	29.563	29.504	29.435	29.501	68	72	70	73	84	76	77.7	84	64	.618	.623	.652	.631
9	29.718	29.730	29.871	29.773	56	56	54	59	61	58	59.3	76	50	.409	.383	.365	.386
10	29.849	29.669	29.546	29.688	53	55	47	55	59	49	54.3	60	44	.376	.380	.297	.351
11	29.770	29.824	29.823	29.806	44	48	41	47	53	46	48.7	54	38	.249	.269	.262	.260
12	29.906	....	29.750	29.828	40	....	48	41	....	51	46.0	56	32	.235	....	.296	.266
13	29.735	29.647	29.655	29.679	46	54	55	49	59	57	55.0	60	37	.271	.351	.407	.343
14	29.702	29.693	29.785	29.727	52	56	47	54	60	49	54.3	60	42	.362	.396	.297	.352
15	29.964	29.938	29.711	29.871	40	41	40	42	44	43	43.0	48	32	.221	.218	.208	.216
16	29.640	29.528	29.543	29.570	38	49	48	40	52	50	47.3	52	27	.203	.308	.309	.273
17	29.661	29.752	29.885	29.766	45	48	46	47	53	49	49.7	58	38	.273	.269	.271	.271
18	30.046	29.931	29.745	29.907	40	52	50	41	58	53	50.7	59	33	.235	.309	.321	.288
19	29.513	29.576	29.621	29.570	50	46	43	54	49	47	50.0	55	39	.308	.271	.225	.268
20	29.847	29.830	29.642	29.773	34	42	41	37	47	43	42.3	58	29	.157	.202	.231	.197
21	29.358	29.253	29.191	29.267	45	49	48	52	54	51	52.3	53	34	.207	.282	.296	.262
22	29.232	29.314	29.622	29.389	41	42	41	43	46	43	44.0	50	35	.231	.215	.231	.226
23	29.834	30.008	29.997	29.946	34	38	35	38	44	37	39.7	44	27	.144	.151	.178	.158
24	29.766	29.660	29.688	29.705	38	49	52	41	55	59	51.7	59	27	.190	.269	.296	.252
25	29.972	30.029	30.064	30.022	38	38	36	39	40	38	39.0	60	28	.216	.203	.186	.202
26	29.942	29.830	29.687	29.819	33	34	36	35	36	37	36.0	37	26	.162	.171	.199	.177
27	29.568	29.530	29.615	29.571	32	36	36	33	40	38	37.0	42	26	.168	.160	.186	.171
28	29.778	29.781	29.754	29.771	32	40	40	33	43	42	39.3	44	24	.168	.208	.221	.199
29	29.726	29.752	29.866	29.781	39	40	43	41	50	45	45.3	49	32	.212	.117	.251	.193
30	29.940	29.667	29.658	29.755	34	50	46	36	56	48	46.7	56	27	.170	.282	.284	.245
31	29.722	29.595	29.614	29.644	46	58	55	50	68	61	59.7	68	39	.258	.350	.354	.320
Means	29.752	29.697	29.696	29.716	45.3	50.8	48.6	47.9	56.3	51.9	51.9	....	....	.290	.327	.317	.311
Nov. 1	29.744	29.639	29.595	29.659	48	57	48	53	70	53	58.7	72	45	.269	.293	.269	.277
2	29.570	29.472	29.151	29.397	52	53	52	55	58	55	56.0	63	44	.349	.336	.349	.345
3	29.434	29.586	29.660	29.560	39	43	36	42	45	40	42.3	56	32	.199	.251	.160	.203
4	29.982	29.923	29.794	29.899	33	41	37	35	46	42	41.0	47	27	.162	.192	.155	.169
5	29.680	29.490	....	29.585	38	50	....	40	55	....	47.5	....	....	.203	.295	....	.249
6	29.761	29.725	29.738	29.741	28	27	29	32	34	33	33.0	56	23	.108	.067	.114	.096
7	29.731	29.816	29.803	29.783	31	29	30	32	30	31	31.0	32	21	.162	.149	.155	.155
8	29.751	29.783	29.768	29.767	27	30	31	28	31	32	30.0	32	19	.136	.155	.162	.151
9	....	29.730	29.770	29.750	....	34	34	....	36	36	36.0	38	29	....	.170	.170	.170
10	29.934	29.909	29.920	29.921	34	38	30	38	44	36	39.3	44	29	.144	.151	.098	.164
11	29.821	29.638	29.498	29.652	30	47	45	32	52	52	45.3	53	23	.144	.257	.207	.203
12	29.738	29.831	29.651	29.740	43	40	40	44	43	43	43.3	56	33	.264	.208	.208	.227
13	29.906	29.964	29.982	29.950	35	38	37	38	42	39	39.7	43	29	.165	.177	.194	.179
14	29.884	29.885	30.092	29.953	38	44	35	42	49	39	43.3	49	32	.177	.223	.152	.184
15	30.464	30.523	30.516	30.501	27	29	29	28	31	30	29.7	39	19	.136	.137	.149	.141
16	30.553	30.307	30.211	30.357	22	38	34	24	44	39	35.7	44	19	.095	.151	.131	.126
17	29.984	29.965	30.094	30.014	43	46	43	46	49	45	46.7	49	30	.238	.271	.251	.253
18	30.019	29.990	29.840	29.949	38	44	45	40	47	47	47.7	47	32	.203	.249	.273	.242
19	29.586	29.493	29.411	29.496	47	48	46	49	50	47	48.7	50	39	.297	.309	.297	.301
20	29.264	29.360	29.493	29.372	41	38	33	42	40	35	39.0	47	28	.244	.203	.162	.203
21	29.591	29.585	29.540	29.572	30	32	34	32	34	36	34.0	36	21	.144	.155	.170	.156
22	29.553	29.492	29.605	29.550	30	36	32	31	39	34	34.7	39	22	.155	.173	.155	.161
23	29.767	29.796	29.796	29.786	24	29	28	26	30	30	28.7	32	18	.106	.149	.130	.128
24	29.786	29.724	29.648	29.719	28	36	31	30	38	33	33.7	38	22	.130	.186	.151	.150
25	29.943	29.566	29.595	29.701	30	40	37	31	45	38	38.0	45	21	.155	.182	.207	.181
26	29.528	29.500	29.218	29.515	35	38	34	37	40	37	38.0	40	28	.178	.203	.157	.179
27	29.545	29.455	29.365	29.455	32	35	32	34	38	34	35.3	38	24	.155	.165	.155	.158
28	29.241	29.252	29.340	29.277	31	36	34	32	39	36	35.7	39	23	.162	.173	.170	.168
29	29.435	29.425	29.505	29.455	32	35	32	34	38	34	35.3	38	25	.155	.165	.155	.158
30	29.685	29.652	29.618	29.651	32	36	35	34	39	37	36.7	39	23	.155	.173	.178	.169
Means	29.754	29.716	29.707	29.724	33.2	38.5	36.0	36.6	42.5	38.7	39.3	....	....	.179	.199	.182	.188

of the north and northwestern lakes, at Charlotte, New York.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U.S. inches and decimals.	Am't of rain or melted snow, U.S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.				7 a. m.	2 p. m.	9 p. m.		
.853	.809	.872	.845	E.	E.	S.....	25	25	4	16.7	S. 85 E..		10	10	10	......	.16
.825	.761	.893	.826	SE..	S......	SE....	4	12	2	5.5	S. 14 E..		10	10	10	......	.03
.890	.891	.838	.873	SE..	E.	S......	2	25	2	8.7	S. 83 E..		10	10	3	.....	.08
.896	.653	.553	.700	S........	W. SW	W.NW	35	45	45	30.3	S. 67 W..		7	8	3	.....	...
.722	.421	.710	.618	N.NW..	N. NW	S.	35	35	4	22.0	N. 24 W.		2	0	0	......	....
.744	.631	.582	.652	S........	S......	W.SW	12	4	45	17.7	S. 51 W.		4	10	10	......	
.796	.627	.720	.714	W. SW..	W. SW	S......	25	35	35	26.8	S. 43 W.		10	6	0	.. ...	.02
.761	.535	.727	.674	S. SW...	W. SW	S......	25	35	35	27 7	S. 30 W.		4	5	0	......	...
.819	.713	.756	.763	NW.	N......	N	25	12	12	15.0	N. 23 W.		10	10	10	......	. .
.869	.761	.853	.828	NE......	E. NE.	N......	35	25	45	31.0	N. 31 E..		10	10	10	......	08
.772	.667	.843	.761	N........	N......	S......	45	12	2	18.3	North. ..		10	8	8	......	.17
.912	.....	.790	.851	S.	....	S......	4	...	4	4.0	South ...		10	...	1	......	..
.781	.703	.874	.786	SE..	NE. ...	S......	12	25	2	9.0	N. 75 E. .		10	9	8	......	...
.867	.765	.853	.828	SE..	N.	N......	2	12	45	18.5	N. 1 E..		8	4	10	.....	...
.829	.756	.750	.778	N. NE...	NE....	N. NE.	45	35	25	34.3	N. 30 E..		10	10	8	......	.02
.820	.794	.856	.823	SE	S	S......	12	4	4	6.2	S. 27 E..		10	10	10	......	
.847	.667	.781	.765	SW.	NW. ..	W......	4	25	12	12.0	N. 66 W.		9	6	7	......	04
.912	.641	.798	.784	S........	S......	S......	25	12	12	16.3	South ...		2	1	5	......	....
.738	.781	.698	.739	S..	W.	NW...	35	12	12	11.2	S. 38 W.		4	9	7	.....	....
.712	.624	.833	.723	N.	SW....	S.	45	12	25	4.7	N. 36 W.		8	7	8	......	.14
.535	.674	.790	.666	S........	S. SW.	S......	35	35	4	24.3	S. 11 W.		10	10	3	......	..
.833	.691	.853	.786	W........	NW...	N......	35	60	35	36.5	N. 45 W.		7	10	10	......	.20
.628	.522	.807	.652	N.	NW. ..	SE....	45	35	12	21.3	N. 15 W.		8	4	10	......	.23
.738	.620	.592	.650	S. SE. ..	S. SW.	S......	35	45	25	33.0	S. 2 W.		10	10	10	.....	.09
.907	.820	.811	.846	N.	NW. ..	SE....	45	4	4	15.0	North. ..		10	10	10	......	.12
.797	.802	.903	.834	S. SE ...	E.	E	60	35	35	36.0	S. 59 E..		10	10	10	......	.45
.893	.645	.811	.783	N. NE...	NW. ..	N. NW.	60	35	25	34.7	N. 6 W.		10	5	8	......	1.36
.893	.750	.829	.824	S........	S.	S......	35	25	12	24.0	South...		8	10	10	.... .	...
.824	.322	.840	.662	S. SE. ..	W.SW	W. SW	12	25	25	17.0	S. 54 W.		10	8	3	......	...
.802	.627	.850	.759	S. SW...	S.	S......	12	25	2	12.7	S. 7 W.		6	2	0	......	...
.716	.511	.659	.629	W. SW..	S.	S......	2	25	25	17.0	S. 2 W.		8	5	0	......	...
.804	.673	.784	.755	....	....	....	....	....	....	2.1	S. 79 W.		8.2	7.5	6.5	......	3.19
.667	.400	.667	.578	SW.	SW...	S.	4	12	25	12.8	S. 17 W.		10	7	0	......	....
.805	.698	.805	.769	SW.	NE. ..	SE....	4	4	12	4.0	S. 45 E..		8	10	7	......	....
.744	.840	.645	.743	W.... ..	NW. ..	N.	45	45	60	40.0	W.40 W.		10	7	10	......	.08
.797	.617	.577	.664	E. NE...	SE.....	SE.. ..	12	12	12	10.3	S. 67 E..		10	6	3	......	.12
.820	.681	......	.750	S........	S. SW.	......	12	12	....	8 0	S. 10 W.		3	6	....	......	...
.594	340	.606	.513	N.	N. NW	NE....	60	45	35	43.0	N. 3 E..		8	5	10	......	....
.896	.890	.893	.389	NE......	NE. ...	NE....	60	60	60	60 0	N. 45 E..		10	10	10	......	....
.883	.893	.896	.891	SE......	E.SE..	NW. ..	25	12	25	4.0	S. 67 E..		10	10	10	......	.05
......	.802	.802	.802	....	W.NW	W.NW	....	35	25	30 0	N. 67 W.		....	10	3	......	..
.628	.522	.462	.537	W........	NW...	S	12	25	4	11.0	N. 65 W.		8	5	4	......	....
.794	.660	.535	.663	S. SW. .	S	S	25	35	45	31.7	S. 5 W..		4	10	10	......	....
.918	.750	.750	.806	NW. .	NW...	S......	35	4	2	12.5	N. 47 W.		10	10	10	......	03
.719	.661	.816	.732	W. NW.	W. SW	S......	25	12	4	11 3	N. 88 W.		9	7	10	.....	.02
.661	.638	.636	.645	S. SW...	N.	N.	25	12	45	11.7	N. 16 W.		10	10	10	......	....
.883	788	.890	.854	N. NE...	NE....	NE....	25	35	45	34.7	N. 40 E..		10	8	2	......	....
.738	.522	.547	.602	E.	S......	S	25	25	12	15.0	S. 34 E..		10	9	7	......	....
.767	.781	.840	.796	S. SW...	N.NW.	N. NW	25	4	12	6 0	S 62 W.		10	10	10	.... .	.16
.829	.772	.847	.813	E..	E.	S	12	4	12	6.7	S. 53 E..		10	10	10	......	.03
.853	.856	.923	.877	SE.	W.	NE.. ..	4	4	12	3.1	N. 52 E..		10	10	10	......	.33
.914	.820	.797	.844	NE......	N. NE.	N	60	35	35	41.0	N. 27 E..		10	10	10	......	1.08
.794	.792	.802	.796	N.	N. NW	S......	4	4	4	1.3	N. 23 W.		10	10	10	......	.14
.893	.726	.792	.804	W..	NW...	N.	2	4	35	12.7	N. 7 W.		6	10	10	......	...
.751	.890	.782	.809	N........	W.NW	N.	35	45	35	32 3	N. 25 W.		10	10	10	.....	1.10
.782	.811	.800	.797	SW.	SW. ..	SW. ..	12	4	12	9.3	S. 45 W..		10	10	0	......	....
.893	.607	.905	.802	SW.	S	S	12	4	2	5.7	S. 30 W.		8	9	8	......	....
.807	.820	.712	.779	SW.	N......	N.	12	12	25	13.0	N. 12 W.		10	9	10	......	.04
.792	.719	.792	.768	NW.	W. SW	SW...	2	12	12	8.0	S. 61 W.		10	8	10	......	.04
.896	.726	.802	.808	S.	W. SW	SW...	4	12	4	6.0	S. 50 W.		10	10	10	......	....
.792	.719	.792	.768	SW.	SW...	SW. .	2	2	2	2.0	S. 45 W.		10	10	2	......	....
.792	.726	.807	.775	SW.	S.. ..	S......	2	4	4	3.2	S. 9 W.		10	10	10	....	...
.796	.715	.756	.756	....	....	....	...	....	...	5.6	N. 5 W.		9.4	8.8	7.8	.....	3.22

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.		Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.				7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°					
Dec. 1	29.588	29.722	29.787	29.699	36	37	55	37	39	37	37.7	39	29		.199	.194	.178	.190
2	29.866	29.986	29.991	29.947	29	29	26	30	30	28	29.3	37	19		.149	.149	.117	.138
3	29.741	29.621	29.696	29.686	26	30	28	28	32	30	30.0	32	18		.117	.144	.130	.130
4	29.739	29.663	29.568	29.657	27	32	31	29	35	33	32.3	35	18		.124	.142	.151	.139
5	29.573	29.445	29.336	29.451	29	32	28	31	34	30	31.7	35	21		.137	.155	.130	.141
6	29.297	29.378	29.498	29.391	20	13	13	22	14	14	16.7	32	9		.085	.067	.067	.073
7	29.729	29.806	29.851	29.795	9	14	16	10	15	17	14.0	18	0		.054	.071	.078	.068
8	29.992	29.925	29.915	29.944	12	22	22	13	23	23	19.7	23	4		.063	.107	.107	.092
9	29.948	29.929	29.833	29.903	17	28	29	18	29	31	26.0	31	7		.083	.142	.137	.121
10	29.841	29.802	29.692	29.778	30	33	34	32	39	39	36.7	39	20		.144	.110	.131	.128
11	29.680	29.628	29.609	29.639	37	46	41	40	52	44	45.8	52	28		.181	.232	.218	.240
12	29.841	29.886	29.959	29.895	41	40	37	43	44	39	42.0	46	31		.231	.196	.194	.207
13	29.839	29.740	29.700	29.759	38	43	48	40	47	51	46.0	51	31		.203	.225	.296	.241
14	29.717	29.682	29.597	29.665	51	52	52	52	54	56	54.0	56	46		.361	.362	.336	.353
15	29.477	29.440	29.253	29.390	53	55	46	56	59	50	55.0	59	39		.363	.380	.258	.334
16	29.196	29.280	29.421	29.299	33	34	31	34	36	32	34.0	50	25		.175	.170	.162	.169
17	29.868	30.039	30.213	30.040	20	23	19	22	25	20	22.3	35	12		.085	.100	.092	.092
18	30.336	30.079	29.806	30.074	17	27	28	19	29	30	26.0	31	10		.071	.124	.130	.108
19	29.750	30.015	30.214	29.998	33	22	15	36	23	16	25.0	36	8		.149	.107	.074	.110
20	30.428	....	30.501	30.464	10	....	9	11	....	10	10.5	15	−3		.057	....	.054	.055
21	30.311	30.083	29.992	30.129	9	19	23	10	20	24	18.0	24	1		.054	.095	.112	.086
22	29.873	29.750	29.729	29.784	29	34	38	31	36	40	35.7	40	16		.137	.170	.203	.170
23	29.830	29.952	30.071	29.951	34	33	30	36	35	32	34.3	41	23		.170	.162	.144	.159
24	30.052	29.902	29.769	29.908	23	32	36	24	33	40	32.3	40	15		.112	.168	.161	.147
25	29.693	29.581	29.564	29.613	44	49	44	46	51	46	47.7	51	34		.262	.321	.268	.284
26	29.527	29.350	29.262	29.379	39	39	38	41	40	39	40.0	51	31		.212	.225	.217	.218
27	29.450	29.555	29.560	29.522	35	36	34	36	38	36	36.7	38	34		.191	.186	.170	.182
28	29.573	29.549	29.578	29.567	33	40	36	35	44	37	38.7	44	26		.162	.195	.199	.185
29	29.529	29.586	29.724	29.613	40	41	35	44	45	38	42.3	45	28		.195	.205	.165	.185
30	29.776	29.721	29.693	29.730	27	30	29	30	32	31	31.0	38	20		.113	.144	.137	.131
31	29.817	29.929	30.038	29.928	25	24	21	26	25	22	24.3	31	13		.123	.117	.101	.114
Means.....	29.770	29.734	29.787	29.761	29.2	32.9	30.7	31.0	35.2	32.7	32.7	....	....		.153	.172	.155	.159
1863.																		
January 1	30.111	30.027	29.911	30.016	19	34	27	20	37	28	28.3	37	10		.092	.157	.135	.128
2	29.907	29.796	29.655	29.786	25	40	36	26	45	38	36.3	45	15		.123	.182	.186	.164
3	29.732	29.667	29.586	29.662	36	51	41	39	56	45	46.7	56	29		.173	.308	.205	.229
4	29.287	29.039	29.279	29.202	38	46	41	41	52	54	45.7	52	30		.203	.232	.218	.218
5	29.438	29.398	29.349	29.395	33	43	38	37	50	40	42.3	51	28		.136	.186	.203	.175
6	29.274	29.255	29.345	29.291	39	34	31	42	38	34	38.0	42	25		.199	.144	.139	.161
7	29.643	29.826	30.010	29.826	15	18	20	16	19	21	18.7	23	1		.074	.087	.096	.086
8	30.086	30.069	30.079	30.078	18	24	23	19	25	25	23.0	25	10		.087	.117	.100	.101
9	30.138	30.078	30.039	30.085	21	32	28	22	33	29	28.0	33	13		.101	.168	.142	.137
10	29.653	29.300	29.302	29.418	34	39	37	35	40	39	38.0	40	18		.183	.225	.194	.201
11	29.358	29.405	29.571	29.445	32	32	31	33	34	32	33.0	40	23		.168	.155	.162	.162
12	29.919	29.813	29.861	29.864	24	28	26.	25	31	28	28.0	32	16		.117	.119	.117	.118
13	30.144	30.026	29.745	29.972	28	28	32	30	33	34	32.3	34	19		.130	.096	.155	.127
14	29.744	29.454	29.291	29.429	37	44	44	42	46	47	45.0	47	27		.155	.262	.249	.222
15	29.488	29.391	29.273	29.384	31	31	30	33	32	31	32.0	47	23		.151	.162	.155	.156
16	29.108	29.174	29.423	29.235	17	15	8	18	16	9	14.3	31	0		.083	.074	.051	.069
17	30.050	30.262	30.397	30.236	9	12	7	10	13	8	10.3	13	−3		.054	.063	.048	.055
18	30.524	30.454	30.440	30.473	8	19	13	9	20	14	14.3	20	−5		.051	.092	.067	.070
19	30.324	30.250	30.217	30.264	19	31	23	20	32	26	26.0	32	3		.092	.162	.089	.114
20	30.132	30.028	30.001	30.054	23	31	29	24	33	31	29.3	33	13		.112	.151	.137	.133
21	29.959	29.940	30.005	29.968	27	34	33	29	36	34	33.0	36	18		.124	.170	.175	.156
22	29.978	29.874	29.820	29.891	32	31	34	33	38	36	35.7	38	25		.168	.144	.170	.161
23	29.850	29.900	30.030	29.927	34	36	34	36	40	36	37.3	40	27		.170	.160	.170	.167
24	29.931	29.858	29.840	29.876	31	39	36	32	44	40	38.7	44	30		.162	.173	.160	.165
25	29.951	29.958	....	29.956	36	40	.	38	44	..	41.0	....	....		.186	.195	...	.190
26	29.818	29.722	29.593	29.721	32	37	31	33	39	35	35.7	45	24		.168	.194	.183	.182
27	29.465	29.551	29.656	29.557	32	31	29	34	32	20	32.0	35	22		.155	.162	.149	.155
28	29.709	29.691	29.569	29.656	27	30	28	29	32	29	30.0	32	23		.124	.144	.142	.137
29	29.381	29.351	29.361	29.364	27	27	30	28	28	32	29.3	32	19		.136	.136	.144	.139
30	29.433	29.440	29.591	29.488	29	34	31	31	36	32	33.0	36	21		.137	.170	.162	.156
31	29.671	29.660	29.678	29.669	30	34	31	32	36	33	33.7	36	22		.144	.170	.151	.155
Means.....	29.794	26.730	29.730	29.748	27.2	32.5	29.5	28.9	35.1	31.0	31.9	...	....		.134	.162	.148	.148

of the north and northwestern lakes, at Charlotte, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.903	.816	.807	.842	S.	W.	NW.	2	12	12	6.8	N. 25 W.	10	10	10	......	.02
.890	.890	.768	.849	W. NW.	W.NW.	W.NW.	25	25	2	17.3	N. 67 W.	9	10	10	......	.09
.768	.794	.782	.781	W.	S.	S.	2	12	12	8.0	S. 5 W.	10	10	4	......	....
.775	.698	.800	.758	W. SW.	SW.	SW.	12	12	2	8.5	S. 55 W.	10	7	10	......	.03
.788	.792	.782	.787	SW.	SW.	SW.	12	12	4	9.3	S. 45 W.	8	6	10	......	....
.721	.816	.816	.784	NW.	NW.	NW.	45	60	45	50.0	N. 45 W.	10	10	10	......	.01
.791	.823	.834	.816	NW.	NW.	N.	60	45	45	47.0	N. 32 W.	10	9	10	......	.03
.810	.864	.861	.846	S.	S. SE.	S. SE.	2	12	4	6.0	S. 20 E.	10	10	3	......	....
.840	.887	.788	.838	S.	SE.	S.	4	2	4	3.2	S. 9 E.	10	10	10	......	.02
.794	.463	.547	.601	SW.	SW.	SW.	4	12	12	9.3	S. 45 W.	10	5	0	......	....
.732	.598	.756	.695	SW.	SW.	SW.	35	25	35	31.7	S. 45 W	10	3	0	......	....
.833	.677	.816	.775	W. SW.	N.	NE.	12	4	12	2.8	N. 18 W.	8	4	10	......	....
.820	.698	.790	.769	E.	S. SE.	SE.	25	35	35	28.3	S. 48 E.	10	10	10	......	....
.930	.867	.747	.848	S.	S.	SE.	25	2	12	12.2	S. 13 E.	10	10	10	......	.10
.809	.761	.716	.762	S.	S.	NW.	12	4	25	6.0	N. 85 W.	10	10	10	......	.07
.895	.802	.896	.864	NW.	W.	NW.	35	45	45	38.7	N. 61 W.	10	8	10	......	1.00
.721	.746	.850	.772	N.	N.	N.	35	25	45	35.0	North.	10	7	10	......	....
.692	.775	.782	.749	W. SW.	S.	S.	4	35	35	24.0	S. 3 W.	9	10	10	......	....
.705	.864	.829	.799	W.	N.	N.	35	45	45	32.3	N. 21 W.	9	2	10	......	....
.797	......	.791	.794	N.	N.	W.	35	12	4	15.7	N. 5 W	10	9	8	......	....
.791	.850	.868	.836	S.	SE.	S.	35	12	4	16.0	S. 10 W	9	10	10	......	....
.788	.802	.821	.803	SE.	S.	N. NW.	4	4	4	1.1	S. 23 E.	10	10	10	......	.01
.802	.797	.794	.797	N.	N. NE.	S.	12	25	2	11.7	N. 76 E.	10	10	10	......	....
.868	.893	.645	.802	NE.	E. SE.	S.	25	12	25	10.3	S. 68 E.	9	10	6	......	....
.843	.859	.843	.848	S.	S.	S.	25	4	2	10.5	South	10	10	10	......	....
.824	.910	.907	.880	SW.	E.	N.	2	25	12	8.7	N. 66 E.	10	10	10	......	.05
.900	.811	.802	.838	NW.	NW.	NW.	12	25	4	13.7	N. 45 W.	10	10	10	......	.54
.797	.677	.903	.792	W.	W.SW.	S.	4	12	4	5.8	S. 62 W.	9	4	5	......	....
.677	.684	.719	.693	W.	W.NW.	W NW.	25	25	12	18.8	N. 69 W.	10	10	10	......	....
.675	.794	.788	.752	N.	NE.	NE.	35	25	45	32.7	N. 30 E.	10	10	10	......	....
.876	.872	.860	.869	NE.	N.	S.	35	25	2	17.8	N. 28 E.	10	10	10	......	....
.802	.786	.797	.795	....	....	....	....	....	....	5.8	N. 48 W.	9.6	8.5	8.6	......	1.97
.850	.712	.883	.815	S. SW.	SW.	S. SW.	12	25	25	20.2	S. 32 W	4	4	6	......	....
.876	.607	.811	.765	S.	S.	S.	25	12	25	20.7	South	4	7	7	......	....
.726	.687	.684	.699	SW.	S. SW.	S.	12	12	12	11.3	S. 23 W.	7	5	10	......	....
.820	.598	.756	.725	S.	S	SW.	25	45	60	39.8	S. 21 W.	7	9	3	......	....
.679	.515	.820	.651	S. SW.	SW.	S. SW.	35	35	12	27.0	S. 32 W	10	3	10	......	....
.744	.628	.712	.695	W. SW.	N. NW.	N.	4	25	35	19.5	N. 13 W.	10	10	10	......	.02
.839	.845	.855	.843	NW.	NW.	N.NW.	60	60	25	47.7	N. 41 W	10	8	10	......	.03
.845	.872	.746	.821	S.	E. SE.	S. SE.	12	12	12	10.5	S. 30 E.	10	10	10	......	.02
.860	.893	.887	.880	E. SE.	SE.	E. SE.	12	12	35	19.3	S. 63 E.	4	7	2	......	....
.898	.910	.816	.875	S.	SW.	S.	45	60	25	39.8	S. 21 W.	10	10	10	......	....
.893	.792	.896	.860	W. NW.	W. SW.	W.	25	25	25	23.7	West.	8	10	10	......	.06
.872	.685	.718	.775	N. NW.	NE.	NW.	12	12	2	7.0	N. 7 E.	10	10	7	......	....
.872	.510	.792	.725	NE.	E.	E.	25	35	35	30.2	N. 79 E.	10	10	10	......	....
.577	.843	.772	.731	S.	S SW.	NW.	35	45	35	22.2	S. 39 W	8	10	10	......	.14
.800	.896	.893	.863	N.	N.	NE.	25	25	45	29.2	N. 1 E.	10	10	10	......	.13
.840	.829	.784	.818	N. NE.	NW.	NW.	45	35	45	35.2	N. 22 W.	10	10	10	......	.69
.791	.810	.777	.693	NW.	W.	S.	35	12	35	12.7	S. 74 W.	10	8	1	......	.05
.784	.850	.816	.817	S.	SE.	SE.	12	12	4	8.7	S. 26 E	7	3	0	......	....
.850	.896	.634	.793	S.	S	S.	35	12	12	19.7	South.	3	10	10	......	....
.868	.800	.788	.819	S.	E.	NE.	25	12	35	12.2	East.	10	10	10	......	....
.775	.802	.895	.824	E.	E.	E. NE.	35	25	12	23.2	N. 86 E.	10	10	10	......	....
.893	.628	.802	.774	SE.	E. SE.	W.	12	12	2	7.3	S. 53 E.	10	10	10	......	.02
.802	.645	.802	.749	W.	W. SW.	NE.	4	12	25	4.5	N. 11 E.	10	10	10	......	.02
.896	.597	.645	.713	E.	S.	SE.	25	12	12	13.0	S. 58 E.	10	9	4	......	....
.811	.677	......	.744	SW.	W.	....	12	4	....	7.7	S. 57 W.	10	3	...	......	....
.893	.816	.898	.869	W. SW.	E.	E.	4	2	12	3.5	S. 82 E.	10	10	10	......	....
.792	.896	.890	.859	NE.	N. NE.	NE.	45	45	12	33.3	N. 35 E	10	10	10	......	.54
.775	.794	.887	.819	NE.	NE.	N.	12	25	12	15.5	N. 35 E.	10	10	10	......	....
.883	.883	.794	.853	N.	W.NW	W.	25	35	12	19.5	N. 49 W	10	10	10	......	....
.788	.802	.896	.829	S.	S.	SW.	12	4	12	8.7	S. 19 W	5	10	4	......	.02
.794	.802	.800	.799	W.	W. SW.	W.SW.	35	45	25	34.3	S. 75 W	9	3	10	......	....
.816	.759	.806	.790	....	....	....	....	....	....	2.6	S. 46 W.	8.5	8.3	8.1	......	1.74

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	29.677	29.380	29.197	29.418	25	34	39	26	40	41	35.7	41	17	.123	.118	.212	.151
2	29.675	29.712	29.745	29.710	22	22	18	23	24	19	22.0	42	10	.107	.095	.089	.096
3	29.872	29.912	30.078	29.954	12	12	6	13	13	7	11.0	20	−2	.063	.063	.046	.057
4	30.511	30.582	30.551	30.548	−6	5	−6	−5	6	−5	−1.3	7	−14	.021	.043	.021	.028
5	30.304	30.023	29.867	30.065	8	19	25	9	20	26	18.3	26	−14	.051	.092	.123	.089
6	29.544	29.503	29.909	29.652	26	30	28	27	31	29	29.0	31	16	.129	.155	.142	.142
7	30.015	29.965	29.947	29.976	22	32	25	23	34	26	27.7	34	15	.107	.155	.123	.128
8	30.122	30.144	30.135	30.130	23	36	32	24	38	34	32.0	38	12	.112	.186	.155	.151
9	30.141	29.903	29.417	29.820	27	29	38	28	31	41	33.3	41	18	.136	.137	.190	.154
10	29.720	29.946	30.091	29.919	33	28	27	36	30	28	31.3	42	20	.149	.130	.136	.138
11	30.097	29.952	29.786	29.945	25	33	29	26	35	30	30.3	35	16	.123	.162	.149	.145
12	29.704	29.601	29.747	29.684	29	27	25	30	28	26	28.0	31	17	.149	.136	.123	.136
13	30.038	30.108	30.225	30.124	17	21	11	18	22	12	17.3	26	3	.083	.101	.061	.082
14	30.199	29.898	29.593	29.833	2	30	32	3	33	35	23.7	35	−7	.036	.132	.142	.103
15	29.610	29.715	29.841	29.722	37	33	30	40	38	32	36.7	40	23	.181	.123	.144	.149
16	30.061	30.281	30.222	30.188	27	27	22	28	28	24	26.7	32	15	.136	.136	.095	.122
17	30.081	29.980	29.861	29.974	30	33	30	32	36	32	33.3	37	10	.144	.149	.144	.146
18	29.865	29.740	29.665	29.757	22	37	35	23	40	38	33.7	40	14	.107	.181	.165	.151
19	29.578	29.350	29.166	29.365	35	36	36	37	40	38	38.3	40	28	.178	.160	.186	.175
20	29.187	29.451	29.755	29.458	33	29	22	34	32	23	29.7	39	15	.175	.126	.107	.136
21	30.145	30.315	30.289	30.249	11	14	13	12	15	14	13.7	23	5	.061	.071	.067	.066
22	30.173	30.021	....	30.098	8	15	....	9	16	....	12.5	....	....	.051	.074	....	.062
23	30.158	30.064	30.198	30.173	17	28	17	18	30	18	22.0	30	−2	.083	.130	.083	.099
24	29.938	29.887	29.929	29.918	17	35	31	18	37	32	29.0	37	5	.083	.178	.162	.141
25	29.971	29.930	29.848	29.916	27	37	31	28	40	33	33.7	41	18	.136	.181	.151	.156
26	29.667	29.439	29.314	29.473	34	41	43	37	44	46	42.3	46	23	.157	.218	.238	.204
27	29.428	29.560	29.868	29.619	36	36	30	38	40	33	37.0	47	24	.186	.160	.132	.159
28	30.021	29.924	29.688	29.878	26	36	31	28	38	33	33.0	38	18	.117	.186	.151	.151
Means	29.910	29.863	29.849	29.877	22.5	28.4	26.1	23.8	30.7	27.7	27.1	....	....	.114	.135	.126	.125
March 1	29.368	29.218	....	29.293	31	31	....	33	33	....	33.0	....	....	.151	.151	....	.131
2	29.585	29.619	29.563	29.589	32	40	33	34	44	35	37.7	45	22	.155	.195	.162	.171
3	29.584	29.607	29.731	29.641	26	25	23	27	26	24	25.7	36	15	.129	.123	.112	.121
4	29.911	29.988	30.065	29.988	16	17	14	17	18	15	16.7	24	4	.078	.083	.071	.077
5	30.165	30.069	29.788	30.007	11	24	21	12	25	22	19.7	27	−2	.061	.117	.101	.093
6	29.380	29.469	29.711	29.520	34	34	30	36	44	32	37.3	44	14	.170	.066	.144	.127
7	29.779	29.691	29.759	29.743	27	26	24	29	28	25	27.3	47	16	.124	.117	.117	.119
8	29.492	29.468	29.431	29.464	23	35	30	24	37	32	31.0	37	18	.112	.178	.144	.145
9	29.408	29.623	29.781	29.604	31	30	27	33	31	28	30.7	33	18	.151	.155	.136	.147
10	29.893	29.747	29.576	29.739	19	32	29	20	37	30	29.0	37	12	.092	.116	.149	.119
11	29.516	29.478	29.645	29.546	28	31	22	30	33	23	28.7	38	14	.130	.151	.107	.129
12	29.725	29.823	29.851	29.799	18	19	16	19	20	17	18.7	23	9	.087	.092	.078	.086
13	29.869	29.805	29.813	29.829	13	22	19	14	23	20	19.0	27	2	.067	.107	.092	.089
14	29.730	29.578	29.672	29.660	20	32	23	21	33	24	26.0	33	9	.096	.168	.112	.125
15	29.878	29.803	29.765	29.815	6	19	18	7	20	19	15.3	25	−3	.046	.092	.087	.075
16	29.803	29.858	29.904	29.855	15	31	26	16	33	27	25.3	38	7	.074	.151	.129	.118
17	29.847	29.607	29.872	29.775	25	38	33	26	41	35	34.0	41	15	.123	.190	.162	.158
18	29.957	30.077	30.100	30.045	21	25	20	22	26	21	23.0	34	12	.101	.123	.096	.107
19	30.240	30.253	30.208	30.234	20	30	21	21	31	22	24.7	32	11	.096	.162	.101	.119
20	30.294	30.311	30.255	30.287	15	27	22	16	28	23	22.3	28	6	.074	.136	.107	.106
21	30.087	29.942	29.862	29.964	25	33	33	26	35	35	32.0	35	12	.123	.162	.162	.152
22	29.908	29.868	29.855	29.877	34	34	32	37	44	34	38.3	44	27	.157	.066	.155	.126
23	29.908	29.860	29.774	29.846	32	34	36	34	36	38	36.0	38	23	.155	.162	.186	.168
24	29.650	29.526	29.451	29.542	38	42	44	40	45	47	44.0	47	29	.203	.228	.249	.227
25	29.260	29.225	29.368	29.284	38	44	46	40	48	48	45.3	53	28	.203	.236	.284	.241
26	29.443	29.518	29.651	29.537	33	34	30	35	37	32	34.7	38	24	.162	.157	.144	.154
27	29.846	29.847	29.803	29.832	28	32	28	30	37	31	32.7	37	21	.130	.116	.119	.122
28	29.558	29.462	29.310	29.443	32	33	34	33	39	36	36.0	40	20	.168	.110	.170	.149
29	29.505	29.556	29.823	29.628	22	29	30	23	30	31	28.0	37	14	.107	.149	.155	.137
30	30.027	29.990	29.851	29.956	25	33	31	26	35	32	31.0	38	15	.123	.162	.162	.149
31	29.531	29.364	29.333	29.409	31	36	33	32	41	35	36.0	41	19	.162	.147	.162	.157
Means.....	29.746	29.718	29.752	29.734	24.8	30.7	27.6	26.2	33.5	29.1	29.6	....	....	.123	.140	.138	.134

of the north and northwestern lakes, at Charlotte, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.876	.476	.824	725	S.......	S......	S. SW.	4	45	45	30.7	S. 11 W.	2	10	10	......	....
.864	.738	.845	.816	W.......	NW...	NW....	45	45	35	38.7	N. 61 W.	7	5	9	.....	...
.810	.810	.769	.796	N.	N	N.....	12	35	60	35.7	North ...	10	10	10	.....	.07
.627	.760	.627	.671	N.	NE...	SE....	35	12	12	13 3	N. 26 E..	10	10	10	.....	.07
.784	.850	.676	.837	S. SE. ..	E. SE..	NE....	35	45	45	29.7	S. 79 E..	10	10	10	.....	....
.880	.893	.887	.887	E.	W.NW	NW..	35	25	35	12.3	N 20 W.	10	10	10	......	1:19
.864	.792	.876	.844	W. NW.	S. SE..	W.....	4	12	4	3.4	S. 18 W.	9	3	2	.....	.15
.868	.811	.792	.824	S. SW....	S....	S......	4	4	2	3.3	S. 9 W..	7	10	10	.....	...
.883	.788	.738	.803	E.	E.	S......	60	25	60	22.7	S. 28 E..	10	10	10	....	.03
.705	.782	.883	.790	W. NW.	W.....	N	45	45	35	33.7	N. 59 W.	10	10	10	......	.22
.876	.797	890	.854	N.	E.	S......	4	25	4	8.3	East.	10	6	2	.....	....
.890	.883	.876	.883	NE.....	NE ..	NE....	25	60	45	43.3	N 45 E..	10	10	10	......	...
.840	.860	.804	.835	W. NW..	NW...	S.......	35	25	4	19.2	N. 62 W..	10	7	0	.....	.13
.730	.703	.698	.710	S.......	SE....	S......	4	60	75	42.7	S. 19 E..	3	2	10	.....	....
.732	.537	.794	.688	SW. ...	W.....	W....	45	45	35	38.5	S 74 W..	2	5	2	......	.01
.883	.883	.738	.835	NW.....	N. ...	W.....	45	12	4	18.7	N. 39 W.	9	8	3	......	....
.794	.705	.794	.764	S.......	E. SE.	S.......	12	12	2	7.2	S. 32 E..	10	0	0	......	....
.864	.732	.719	.772	S.......	E.	S......	4	23	25	13.0	S. 41 E .	7	10	10	...	....
.807	.645	.811	.754	E.	E.	W.....	12	12	2	7.3	East.....	10	10	10	......	.13
.895	.694	.864	.818	NW....	NW. ..	N. NW	25	45	60	42.3	N. 35 W.	10	10	10	......	.30
.804	.823	.816	.814	N...	N.	N......	43	35	25	35.0	North ...	9	9	5	.....	....
.784	.829	....	.807	E.	E.	....	45	35	....	40.0	East.....	10	10	....	......	....
.840	.782	.840	.821	E.	E. ...	S.......	4	12	2	5.3	S. 83 E..	10	4	0	......	.03
.840	.807	.896	.848	S. SE .	NW....	SE...	4	12	12	1.3	S. 22 E..	10	9	10	......	...
.883	.732	.800	.805	S SW..	S.......	S.	12	12	4	9.2	S. 10 W.	6	10	3	.....	....
.712	.756	.767	.745	SE.	SE....	SW ..	12	12	25	11 3	S. 1 W.	10	10	10	......	....
.811	.645	.703	.720	W. SW..	W.. ..	NW...	35	45	45	36.7	N. 80 W.	10	10	10	......	...
.768	.811	.800	.793	N........	N. NE.	NE....	4	12	25	13.2	N. 35 E..	9	8	10	......	...
.810	.761	.804	.795	....	....	....	....	....	....	3.4	N. 28 W.	8.5	8.1	7.0	......	2.33
.800	.800	......	.800	SE......	E	....	45	12	....	27.0	S. 54 E..	10	10	..	......	....
.792	.677	.797	.755	SW.....	W.. ..	E. ...	25	25	35	6.5	S. 23 W.	9	3	10	......	.55
.880	.876	868	.875	NE......	E. NE.	E. NE.	45	35	35	37 0	N. 59 E..	10	10	10	...	.05
.834	.840	.823	.832	N........	NW...	W.....	35	35	12	23.2	N. 32 W.	8	7	10	......	.04
.804	.872	.860	.845	SW. ..	S......	S.......	4	25	35	21.0	S. 2 W..	2	10	10	......	...
.802	.227	.794	.608	S........	W.. ..	N......	35	45	45	15.3	N. 77 W	10	4	7	......	....
.775	.768	.872	.805	NE......	NE....	NE...	35	60	60	51.7	N. 45 E..	10	10	10	......	....
.868	.807	.794	.823	E.	SW...	S......	25	12	4	6.9	S. 53 E..	10	10	10	......	.29
.800	.893	.883	.859	W.......	W.. ..	W. SW	45	45	45	44.0	S. 83 W.	6	7	3	......	.07
.850	.527	.890	.756	W. SW..	S. SE..	SE ..	12	35	4	13.7	S. 7 E.	10	4	2	......	....
.782	.800	.864	.815	S.........	NW...	NW..	2	35	45	26.2	N. 46 W.	5	10	10	......	....
.845	.850	.834	.843	N . .	N......	W.. ..	25	12	12	13.0	N. 18 W.	10	10	10	......	....
.816	.864	.850	.843	W. SW..	NW....	SW...	12	25	12	12.7	N. 83 W.	8	10	10	.....	.06
.855	.893	.868	.872	W.......	W. SW	NE...	25	25	60	11.0	N 10 W..	10	8	4	......	.03
.769	.850	.845	.821	E. SE. ..	E. NE.	E. NE.	12	35	35	26.0	N. 73 E..	10	10	10	......	....
.829	.800	.880	.836	E........	E.	S.....	12	12	12	9 0	S. 63 E.	10	0	2	....	....
.876	.738	.797	.804	S.........	S..	N.	25	4	12	5.7	South....	10	10	10	....	....
.860	.876	.855	.854	NE......	NE....	S......	45	12	4	18.0	N. 48 E. .	10	3	0	......	....
.855	.896	.860	.870	NE......	NE....	SE....	12	12	12	8.8	N. 71 E..	0	10	2	......	....
.829	.883	.864	.859	SE......	E. NE.	NE....	12	35	35	24.0	N. 66 E..	0	9	0	......	....
.876	.797	.797	.823	SE......	SE....	SE....	35	25	45	35.0	S. 45 E..	10	10	10	......	....
.712	.227	792	.577	SW.....	S......	S......	2	4	2	2.5	S. 11 W.	10	10	0	......	....
.792	.797	.811	.800	NE......	E. NE.	E.....	25	35	35	30.3	N. 70 E..	10	10	10	......	...
.820	.762	.772	.785	SE..	S.......	S.... .	35	45	60	43.7	S. 11 E..	6	10	10	......	....
.820	.704	.850	.791	E. SE. ..	W.. ..	S.. .	60	45	25	16.5	S. 12 E..	10	10	4	......	.42
.797	.712	.794	.768	W. SW ..	W. SW	W. NW	12	25	45	25.3	N. 88 W.	9	10	10	.....	...
.782	.527	.685	.665	NW......	N.. ...	S......	45	12	4	16.8	N. 39 W.	10	8	0	......	....
.893	.463	.802	.719	SE......	S. SE..	S. SE..	12	25	12	16.0	S. 28 E..	10	10	10	......	....
.864	.890	.893	.882	NW.....	W. NW	NW...	35	45	45	40.8	N. 53 W..	8	10	10	......	.03
.876	.797	.896	.856	N. NW. .	N.....	S......	25	12	2	11.6	N. 16 W.	7	10	2	......	....
.896	.567	.797	.753	S. SE. ..	N. NW.	NW...	12	4	25	6.0	N. 45 W..	10	10	10	......	....
.827	.741	.833	.800	....	... .	....	....	....	....	2.2	N. 47 E..	8.3	8.5	6.8	......	1.54

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	29 677	29.380	29.197	29.418	25	34	39	26	40	41	35.7	41	17	.123	.118	.212	.151
2	29.675	29.712	29.745	29.710	22	22	18	23	24	19	22.0	42	10	.107	.095	.069	.096
3	29.872	29.912	30 078	29 954	12	12	6	13	13	7	11.0	20	− 2	.063	.063	.046	.057
4	30.511	30.582	30.551	30.548	−6	5	−6	−5	6	−5	−1.3	7	−14	.021	.043	.021	.028
5	30.304	30.023	29.867	30.065	8	19	25	9	20	26	18.3	26	−14	.051	.092	.123	.089
6	29.544	29.503	29.909	29.652	26	30	28	27	31	29	29.0	31	16	.129	.155	.142	.142
7	30.015	29.965	29.947	29.976	22	32	25	23	34	26	27.7	34	15	.107	.155	.123	.128
8	30.122	30.134	30.135	30.130	23	36	32	24	38	34	32.0	38	12	.112	.186	155	.151
9	30.141	29.903	29.417	29.820	27	29	38	28	31	41	33.3	41	18	.136	137	.190	.154
10	29.720	29.946	30.091	29.919	33	28	27	36	30	28	31.3	42	20	.149	.130	.136	.138
11	30.097	29 952	29.786	29.945	25	33	29	26	35	30	30.3	35	16	123	.162	.149	.145
12	29.701	29 601	29.747	29.684	29	27	25	30	28	26	28.0	31	17	.149	.136	.123	.136
13	30.038	30.108	30.225	30.124	17	21	11	18	22	12	17.3	26	3	.083	.101	.061	.082
14	30.199	29.898	29.593	29.833	2	30	32	3	33	35	23.7	35	− 7	.036	.132	.142	.103
15	29.610	29.715	29 841	29.722	37	33	30	40	38	32	36 7	40	23	.181	.123	.144	.149
16	30.061	30.281	30.222	30.188	27	27	22	28	28	24	26.7	32	15	.136	.136	.095	.122
17	30.081	29 980	29.861	29 974	30	33	30	32	36	32	33.3	37	10	.144	.149	.144	.146
18	29.865	29.740	29.665	29.757	22	37	35	23	40	38	33.7	40	14	.107	.181	.165	.151
19	29.578	29.350	29.166	29.365	35	36	36	37	40	38	38.3	40	28	.178	.160	.186	.175
20	29.187	29.451	29.755	29.458	33	29	22	34	32	23	29.7	39	15	.175	.126	.107	.136
21	30.145	30.315	30.289	30.249	11	14	13	12	15	14	13.7	23	5	.061	.071	.067	.066
22	30.173	30.024	....	30.098	8	15	....	9	16	...	12.5	....	....	.051	.074	....	.062
23	30.158	30.064	30.198	30.173	17	28	17	18	30	18	22.0	30	− 2	.083	.130	.083	.099
24	29.938	29.887	29.929	29.918	17	35	31	18	37	32	29.0	37	5	.083	.178	.162	.141
25	29.971	29.930	29.848	29.916	27	37	31	28	40	33	33.7	41	18	.136	.181	.151	.156
26	29.667	29.439	29.314	29.473	34	41	43	37	44	46	42.3	46	23	.157	.218	.238	.204
27	29.428	29.560	29.868	29.619	36	36	30	38	40	33	37.0	47	24	.186	.160	.132	.159
28	30.021	29.924	29.688	29.878	26	36	31	28	38	33	33.0	38	18	.117	.186	.151	.151
Means	29.910	29.863	29.849	29.877	22.5	28.4	26.1	23.8	30.7	27.7	27.1	....	...	.114	.135	.126	.125
March 1	29 368	29.218	....	29.293	31	31	....	33	33	....	33.0	....	....	.151	151	....	.131
2	29.585	29.619	29.563	29.589	32	40	33	34	44	35	37.7	45	22	.155	.195	.162	.171
3	29.584	29.607	29.732	29.641	26	25	23	27	26	24	25.7	36	15	.129	.123	112	.121
4	29.911	29 988	30.065	29.988	16	17	14	17	18	15	16.7	24	4	.078	.084	.071	.077
5	30.165	30.069	29.788	30.007	11	24	21	12	25	22	19.7	27	− 2	.061	.117	.101	.093
6	29.380	29.469	29.711	29.520	34	34	30	36	44	32	37.3	44	14	.170	.066	.144	.127
7	29.779	29.691	29.759	29.743	27	26	24	29	28	25	27.3	47	16	124	117	.117	.119
8	29.492	29.468	29.431	29.464	23	35	30	24	37	32	31.0	37	13	.112	.178	.144	.145
9	29.408	29.623	29.781	29 604	31	30	27	33	31	28	30.7	33	18	.151	155	.136	.147
10	29.893	29 747	29.576	29.739	19	32	29	20	37	30	29.0	37	12	.092	.116	.149	.119
11	29.516	29.478	29.645	29.546	28	31	22	30	33	23	28.7	38	14	.130	.151	.107	.129
12	29.725	29.823	29.851	29.799	18	19	16	19	20	17	18 7	23	9	.087	.092	.078	.086
13	29.869	29.835	29 813	29.829	13	22	19	14	23	20	19.0	27	2	.067	107	.092	.089
14	29.730	29.578	29 672	29 660	20	32	23	21	33	24	26.0	33	9	.096	168	.112	.125
15	29 878	29.803	29.765	29.815	6	19	18	7	20	19	15.3	25	− 3	.046	.092	.087	.075
16	29 803	29.858	29.904	29.855	15	31	26	16	33	27	25.3	38	7	074	151	.129	.118
17	29.847	29.607	29.872	29.775	25	38	33	26	41	35	34.0	41	15	.123	.190	.162	.158
18	29.957	30.077	30.100	30.045	21	25	20	22	26	21	23.0	34	12	.101	.123	.096	.107
19	30.240	30.253	30.208	30.234	20	30	21	21	31	22	24 7	32	11	.096	.162	.101	.119
20	30.294	30.311	30.255	30.287	15	27	22	16	28	23	22.3	28	6	.074	.136	.107	.106
21	30.087	29.942	29 862	29.964	25	33	33	26	35	35	32.0	35	12	.123	.162	.162	.152
22	29.908	29.868	29.855	29.877	34	34	32	37	44	34	38.3	44	27	.157	066	.155	.126
23	29.908	29.860	29.774	29.848	32	34	36	34	36	38	36.0	38	23	.155	.162	.186	.168
24	29 650	29.526	29.451	29.542	38	42	44	40	45	47	44.0	47	29	203	.228	249	.227
25	29.260	29.225	29.368	29.284	38	44	46	40	48	48	45.3	53	28	203	.236	.284	.241
26	29.443	29.518	29.651	29.537	33	34	30	35	37	32	34.7	38	24	.162	.157	.144	.154
27	29.846	29 847	29.803	29.832	28	32	28	30	37	31	32.7	37	21	.130	.116	.119	.122
28	29.558	29.462	29.310	29.443	32	33	34	33	39	36	36.0	40	20	.168	.110	170	.149
29	29.505	29 556	29.823	29 628	22	29	30	23	30	31	28.0	37	14	.107	.149	.155	.137
30	30.027	29.990	29.851	29.956	25	33	31	26	35	32	31 0	38	15	.123	.162	.162	.149
31	29.531	29.364	29.333	29.409	31	36	33	32	41	35	36.0	41	19	.162	.147	.162	.157
Means.....	29.746	29.718	29.752	29.734	24.8	30.7	27.6	26.2	33.5	29.1	29.6	....	....	.123	.140	.138	.134

of the north and northwestern lakes, at Charlotte, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.876	.476	.824	725	S	S	S. SW.	4	45	45	30.7	S. 11 W.	2	10	10	......	....
.864	.738	.845	.816	W	NW	NW	45	45	35	38.7	N. 61 W.	7	5	9	......	...
.810	.810	.769	.796	N	N	N	12	35	60	35.7	North	10	10	10	......	.07
.627	.760	.627	.671	N	NE	SE	35	12	12	13.3	N. 26 E.	10	10	10	......	.07
.784	.850	.876	.837	S. SE.	E. SE.	NE	35	45	45	29.7	S. 79 E.	10	10	10	......	....
.880	.893	.887	.887	E	W. NW	NW	35	25	35	12.3	N. 20 W.	10	10	10	......	1:19
.864	.792	.876	.844	W. NW.	S. SE.	W	4	12	4	3.4	S. 18 W.	9	3	2	......	.15
.868	.811	.792	.824	S. SW.	S	S	4	4	2	3.3	S. 9 W.	7	10	10	......	...
.883	.788	.738	.803	E	E	S	60	25	60	22.7	S. 28 E.	10	10	10	......	.03
.705	.782	.883	.790	W. NW.	W	N	45	45	35	33.7	N. 59 W.	10	10	10	......	.22
.876	.797	890	.854	N	E	S	4	25	4	8.3	East	10	6	2	......	....
.890	.883	.876	.883	NE	NE	NE	25	60	45	43.3	N. 45 E.	10	10	10	......	...
.840	.860	.804	.835	W. NW.	NW	S	35	25	4	19.2	N. 62 W.	10	7	0	......	.13
.730	.703	.698	.710	S	SE	S	4	60	75	42.7	S. 19 E.	3	2	10	......	....
.732	.537	.794	.688	SW.	W	W	45	45	35	38.5	S. 74 W.	2	5	2	......	.01
.883	.883	.738	.835	NW	N	W	45	12	4	18.7	N. 39 W.	9	8	3	......	....
.794	.705	.794	.764	S	E. SE.	S	12	12	2	7.2	S. 32 E.	10	0	0	......	....
.864	.732	.719	.772	S	E	S	4	25	25	13.0	S. 41 E.	7	10	10	......	....
.807	.645	.811	.754	E	E	W	12	12	2	7.3	East	10	10	10	......	.13
.895	.694	.864	.818	NW	NW	N. NW	25	45	60	42.3	N. 35 W.	10	10	10	......	.30
.804	.823	.816	.814	N	N	N	43	35	25	35.0	North	9	9	5	......	....
.784	.829	......	.807	E	E	....	45	35	....	40.0	East	10	10	....	......	....
.840	.782	.840	.821	E	E	S	4	12	2	5.3	S. 83 E.	10	4	0	......	.03
.840	.807	.896	.848	S. SE	NW	SE	4	12	12	1.3	S. 22 E.	10	9	10	......	...
.883	.732	.800	.805	S. SW.	S	S	12	12	4	9.2	S. 10 W.	6	10	3	......	....
.712	.756	.767	.745	SE	SE	SW	12	12	25	11.3	S. 1 W.	10	10	10	......	....
.811	.645	.703	.720	W. SW.	W	NW	35	45	45	36.7	N. 80 W.	10	10	10	......	...
.768	.811	.800	.793	N	N. NE.	NE	4	12	25	13.2	N. 35 E.	9	8	10	......	...
.810	.761	.804	.795	....	....	....	....	....	....	3.4	N. 28 W.	8.5	8.1	7.0	......	2.33
.800	.800	......	.800	SE	E	....	45	12	....	27.0	S. 54 E.	10	10	..	......	....
.792	.677	.797	.755	SW	W	E	25	25	35	6.5	S. 23 W.	9	3	10	......	.55
.880	.876	868	.875	NE	E. NE.	E. NE.	45	35	35	37.0	N. 59 E.	10	10	10	...	.05
.834	.840	.823	.832	N	NW	W	35	35	12	23.2	N. 32 W.	8	7	10	......	.04
.804	.872	.860	.845	SW.	S	S	4	25	35	21.0	S. 2 W.	2	10	10	......	...
.802	.227	.794	.608	S	W	N	35	45	45	15.3	N. 77 W.	10	4	7	......	....
.775	.768	.872	.805	NE	NE	NE	35	60	60	51.7	N. 45 E.	10	10	10	......	....
.868	.807	.794	.823	E	SW	S	25	12	4	6.9	S. 53 E.	10	10	10	......	.29
.800	.893	.883	.859	W	W	W. SW	45	45	45	44.0	S. 83 W.	6	7	3	......	.07
.850	.527	.890	.756	W. SW.	S. SE.	SE	12	35	4	13.7	S. 7 E.	10	4	2	......	....
.782	.800	.864	.815	S	NW	NW	2	35	45	26.2	N. 46 W.	5	10	10	......	....
.845	.850	.834	.843	N	N	W	25	12	12	13.0	N. 18 W.	10	10	10	......	....
.816	.864	.850	.843	W. SW.	NW	SW	12	25	12	12.7	N. 83 W.	8	10	10	......	.06
.855	.893	.868	.872	W	W. SW	NE	25	25	60	11.0	N. 10 W.	10	8	4	......	.03
.769	.850	.845	.821	E. SE.	E. NE.	E. NE.	12	35	35	26.0	N. 73 E.	10	10	10	......	....
.829	.800	.880	.836	E	E	S	12	12	12	9.0	S. 63 E.	10	0	2	......	....
.876	.738	.797	.804	S	S	N	25	4	12	5.7	South	10	10	10	......	....
.860	.876	.855	.864	NE	NE	S	45	12	4	18.0	N. 48 E.	10	3	0	......	....
.855	.896	.860	.870	NE	NE	SE	12	12	12	8.8	N. 71 E.	0	10	2	......	....
.829	.883	.864	.859	SE	E. NE.	NE	12	35	35	24.0	N. 66 E.	0	9	0	......	....
.876	.797	.797	.823	SE	SE	SE	35	25	45	35.0	S. 45 E.	10	10	10	......	....
.712	.227	.792	.577	SW	S	S	2	4	2	2.5	S. 11 W.	10	10	0	......	....
.792	.797	.811	.800	NE	E. NE.	E	25	35	35	30.3	N. 70 E.	10	10	10	......	...
.820	.762	.772	.785	SE	S	S	35	45	60	43.7	S. 11 E.	6	10	10	......	....
.820	.704	.850	.791	E. SE.	W	S	60	45	25	16.5	S. 12 E.	10	10	4	......	.42
.797	.712	.794	.768	W. SW.	W. SW.	W. NW	12	25	45	25.3	N. 88 W.	9	10	10	......	...
.782	.527	.685	.665	NW	N	S	45	12	4	16.8	N. 39 W.	10	8	0	......	....
.893	.463	.802	.719	SE	S. SE.	S. SE.	12	25	12	16.0	S. 28 E.	10	10	10	......	....
.864	.890	.893	.882	NW	W. NW	NW	35	45	45	40.8	N. 53 W.	8	10	10	......	.03
.876	.797	.896	.856	N. NW.	N	S	25	12	2	11.6	N. 16 W.	7	10	2	......	....
.896	.567	.797	.753	S. SE.	N. NW.	NW	12	4	25	6.0	N. 45 W.	10	10	10	......	....
.827	.741	.833	.800	....	....	....	....	....	....	2.2	N. 47 E.	8.3	8.5	6.8	......	1.54

O—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.		Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.				7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°					
April 1	29.586	29.559	29.329	29.491	14	24	24	15	25	25	21.7	35	7		.071	.117	.117	.102
2	28.795	28.977	29.320	29.031	38	36	34	46	41	36	41.0	46	18		.125	.147	.170	.147
3	29.651	29.840	29.935	29.809	31	34	32	32	36	34	34.0	38	23		.162	.170	.155	.162
4	30.109	30.115	29.931	30.052	27	30	29	29	34	32	31.7	36	20		.124	.121	.126	.124
5	29.678	29.568	29.490	29.579	30	32	33	33	33	36	34.0	36	24		.132	.168	.149	.149
6	29.453	29.499	29.545	29.499	29	40	34	31	44	34	36.3	46	22		.137	.195	.155	.162
7	29.723	29.858	29.983	29.855	30	32	29	31	33	31	31.7	34	21		.155	.168	.137	.153
8	30.001	29.872	29.951	29.941	27	32	30	28	35	32	31.7	35	18		.136	.142	.144	.141
9	29.968	29.978	29.917	29.954	32	34	35	33	48	37	39.3	49	20		.168	.014	.178	.120
10	29.895	29.643	29.480	29.673	32	47	49	34	51	55	47.7	55	24		.155	.231	.269	.218
11	29.540	29.480	29.431	29.484	49	61	60	55	73	66	64.7	74	44		.269	.376	.438	.361
12	29.561	29.696	29.854	29.704	47	40	36	51	45	38	44.7	65	29		.270	.182	.186	.213
13	29.945	29.926	....	29.940	31	35	....	34	40	....	37.0	...	...		.139	.139	....	.139
14	29.943	29.900	29.806	29.883	30	39	38	31	50	41	40.7	51	29		.155	.094	.190	.146
15	29.804	29.746	29.770	29.773	39	45	45	42	56	51	49.7	58	29		.199	.155	.220	.191
16	29.759	29.736	29.667	29.720	39	40	40	40	41	41	40.7	52	33		.225	.235	235	.232
17	29.670	29.702	29.714	29.695	38	40	40	40	43	42	41.7	43	33		.203	.208	.221	.211
18	29.819	29.792	29.731	29.782	38	47	40	40	53	42	45.0	54	30		.203	.244	.221	.223
19	29.781	29.777	29.698	29.752	41	47	45	43	51	48	47.3	52	30		.231	.270	.260	.254
20	29.801	29.926	29.989	29.905	41	41	38	43	44	40	42.3	48	33		.231	.218	.203	.217
21	30.088	30.084	29.993	30.055	45	48	43	48	55	46	49.7	56	32		.260	.243	.238	.247
22	30.031	29.902	29.848	29.920	40	46	44	43	53	48	48.0	54	31		.208	.219	.236	.221
23	29.766	29.636	29.548	29.650	42	45	46	45	53	48	48.7	57	31		.228	.194	.284	.235
24	29.514	29.364	29.514	29.464	43	52	41	46	61	46	51.0	63	34		.238	269	192	.233
25	29.690	29.694	29.718	29.701	30	37	37	36	46	44	42.0	50	27		.098	.103	.129	.110
26	29.872	29.814	29.785	29.824	35	43	44	39	53	49	47.0	55	28		.152	.146	.223	.174
27	29.834	29.700	29.607	29.714	39	50	51	42	60	56	52.7	65	28		.199	.229	.308	.245
28	29.614	29.557	29.564	29.578	43	49	43	46	50	46	50.3	59	30		.238	.216	.238	.227
29	29.564	29.537	29.556	29.552	40	45	46	42	55	49	48.7	61	31		.221	.168	.271	.220
30	29.669	29.710	29.661	29.680	40	49	46	44	61	51	52.0	65	31		.195	.190	.245	.210
Means.....	29.737	29.719	29.700	29.722	36.0	41.3	39.6	38.7	47.8	42.9	43.1	...	...		.184	.185	211	.193
May 1	29.714	29.633	29.642	29.663	42	56	52	46	71	58	58.3	70	31		.215	.250	.476	.314
2	29.640	29.744	29.759	29.714	46	45	41	51	52	44	49.0	57	37		.245	.207	.218	.223
3	29.816	29.763	29.699	29.760	38	40	41	41	48	44	44.3	48	32		.190	.143	218	.181
4	29.610	29.646	29.662	29.639	39	42	41	40	45	43	42.7	47	33		.225	.228	231	.228
5	29.680	29.677	29.684	29.680	38	38	40	40	41	42	41.0	44	32		.203	.193	.221	.204
6	29.750	29.751	29.741	29.747	39	39	41	40	42	43	41.7	43	32		.225	.199	.231	.218
7	29.720	29.643	29.660	29.674	39	47	42	40	53	44	45.7	54	32		.225	.244	.241	.237
8	29.690	29.681	29.648	29.673	38	48	49	40	57	52	49.7	61	27		.203	.217	.308	.243
9	29.698	29.665	29.673	29.679	44	52	54	48	53	61	57.3	68	35		.235	.243	.345	.268
10	29.734	29.670	29.598	29.667	54	63	62	57	76	67	66.7	76	45		.378	.402	489	.423
11	29.675	29.775	29.790	29.747	58	52	48	64	58	51	57.7	66	43		.403	.309	.296	.336
12	29.710	29.801	29.734	29.748	45	52	52	47	57	53	52.3	58	38		.273	.322	375	.323
13	29.757	29.708	29.645	29.703	50	52	52	52	58	53	54.3	62	42		.334	.309	.375	.339
14	29.618	29.568	29.628	29.605	45	47	46	47	48	48	47.7	53	37		.273	.310	.284	.289
15	29.734	29.718	29.684	29.712	42	50	50	46	59	53	52.7	60	33		.215	.242	.321	.259
16	29.494	29.426	29.574	29.498	50	60	57	53	67	61	60.3	68	39		.321	.425	.412	.386
17	29.583	29.607	29.600	29.597	48	48	48	50	55	51	52.3	61	39		.309	.230	296	.278
18	29.624	29.701	29.704	29.676	43	49	50	46	58	53	52.3	58	37		.238	.229	.321	.263
19	29.792	29.753	29.720	29.755	45	62	52	50	71	62	61.0	71	36		.234	.436	.256	.309
20	29.790	29.743	29.783	29.772	54	62	56	59	75	65	66.3	75	47		.351	.382	.330	.354
21	29.903	29.945	29.926	29.925	58	67	52	65	83	71	73.0	83	54		.396	.447	.269	.371
22	29.977	29.881	29.836	29.898	59	71	65	63	84	71	72.7	84	52		.447	.583	.537	.522
23	29.815	29.726	29.610	29.727	60	64	61	64	78	66	69.3	83	52		.465	.409	.470	.448
24	29.593	29.579	29.638	29.603	60	69	57	65	80	63	69.3	81	50		.451	.561	.386	.466
25	29.651	29.677	29.720	29.684	54	58	50	57	64	55	58.7	74	44		.375	.403	.295	.358
26	29.796	29.815	29.647	29.753	53	53	51	57	59	56	47.0	67	41		.363	.323	.308	.331
27	29.870	29.883	29.810	29.851	55	63	58	59	71	62	64.0	73	43		.380	.469	429	.426
28	29.864	29.803	29.736	29.802	52	60	63	56	71	71	66.0	78	41		.335	.371	.469	.394
29	29.693	29.590	29.469	29.584	58	62	58	61	69	63	64.3	77	41		.443	.462	.416	.440
30	29.347	29.242	29.226	29.272	63	70	66	67	76	68	70.3	77	51		.522	.652	.612	.595
31	29.156	29.116	29.073	29.115	65	65	63	68	68	66	67.3	76	55		.577	.577	.536	.563
Means.....	29.693	29.675	29.656	29.675	49.5	55.0	52.2	52.8	63.2	56.8	57.6	...	....		.324	.347	.353	.341

of the north and northwestern lakes, at Charlotte, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.		°	7 a. m.	2 p. m.	9 p. m.		
.823	.872	.872	.856	NW...	S. SW.	SW....	45	35	12	18.0	S. 80 W..	10	10	10	......	.04
.410	.567	.802	.589	SW.....	W. NW	W. NW.	45	60	12	34.0	S. 88 W..	10	10	8	......	....
.896	.802	.792	.830	N. NE...	N NE.	NE. ..	25	12	2	12.8	N. 23 E..	9	3	8	......	....
.775	.617	.694	.695	NE ..	NE....	N.	25	35	35	29.5	N. 29 E..	6	3	3	......	....
.703	.893	.705	.767	N. NE...	N......	SE.. ..	45	25	12	21.3	N 23 E .	10	10	10	......	....
.788	.677	.792	.752	W SW...	W. NW	NW...	12	4	35	15.7	N. 62 W..	10	10	10	......	.42
.893	.893	.788	.858	NE......	N. NE.	NE. ..	60	45	45	49.0	N. 38 E..	10	10	10	......	.07
.883	.698	.794	.792	NE......	N. NE.	S......	45	12	4	17.7	N. 43 E..	10	10	10	......	.04
.893	.041	.807	.580	NW.	W. NW	S......	25	25	12	14.3	N. 69 W..	10	10	0	......	....
.792	.552	.629	.655	S	S	S	12	12	12	12.0	South....	6	10	10	......	....
.620	.464	.685	.589	S. SW. .	W. SW.	S	25	25	25	21.2	S. 30 W..	10	10	5	......	....
.722	.607	.811	.713	NW.....	N.	NE. ..	25	25	45	25.3	N 11 E..	10	10	10	......	....
.712	.557	......	.634	NE......	N. NE.	....	25	12	....	12.0	N. 38 E..	0	10	....	......	....
.893	.261	.738	.631	W...	NE. ...	NE....	4	12	12	7.2	N. 37 E..	0	4	0	......	....
.744	.346	.590	.560	E. SE.	E. ..	SE.. ..	12	25	45	25.7	S. 62 E..	10	10	10	......	....
.910	.912	.912	.911	E..... .	E. NE.	E. NE.	45	35	60	46.0	N. 75 E..	10	10	10	......	.91
.820	.750	.829	.799	E. NE...	E NE.	NE....	45	25	12	27.2	N. 64 E..	10	10	10	......	.42
.820	.606	.829	.752	NE	NE....	S......	2	4	12	2.9	S. 28 E..	10	6	0	......	.12
.833	.722	.777	.777	NE	NE....	E.	12	25	12	15.5	N. 56 E..	10	3	0	......	....
.833	.756	.820	.803	E NE...	E..... .	E.	35	35	35	34.3	N. 83 E..	10	10	10	......	....
.777	.561	.767	.702	E. SE ...	E....	NE	12	25	35	21.3	N. 71 E..	10	4	0	......	.16
.750	.544	.704	.666	E.	E.	E. SE..	4	25	12	13.6	S. 84 E..	10	3	0	......	....
.762	.483	.850	.698	S	NE....	W.. ..	4	25	4	6.5	N. 45 E..	3	3	0	......	....
.767	.502	.617	.629	NE......	W.. ..	N.	4	12	35	13.0	N. 14 W..	7	3	10	......	....
.462	.330	.446	.413	N.	N NW	N NW.	35	45	12	30.0	N. 14 W..	10	3	0	......	...
.636	.363	.638	.546	N.	N. NW.	SW...	25	25	12	14.5	N. 25 W..	3	0	0	......	....
.744	.442	.687	.624	W..	N.	S	12	25	4	8.3	N. 30 W .	10	3	0	......	....
.767	.432	.767	.655	S. SW...	NE.....	NE....	12	4	12	2.2	N. 88 E..	7	9	6	......	....
.829	.388	.781	.666	NE......	NE ...	W.....	45	25	2	23.0	N. 44 E..	10	5	0	......	....
.677	.353	.653	.561	NE......	NE....	NE....	4	12	2	6.0	N. 45 E..	2	1	0	......	...
.764	.566	.743	.690	....	....	....	....	....	...	9.9	N. 37 E..	8.1	6.7	5.1	......	2.16
.691	.330	.695	.572	S.........	N. ...	S......	12	4	12	6.7	South....	10	2	0	......	....
.653	.535	.756	.648	S.... ...	E. NE.	E. NE.	2	12	25	12.3	N. 76 E..	10	10	0	......	....
.738	.426	.756	.640	E..	E. NE.	NE....	35	25	45	33.0	N. 65 E..	7	9	10	......	....
.910	.762	.833	.835	NE.	E. NE.	W.....	45	12	12	15.8	N. 40 E..	10	10	4	......	.11
.820	.738	.829	.796	E. NE...	NE....	NE....	60	75	45	59.0	N. 53 E..	10	10	10	......	....
.910	.744	.833	.829	E. NE...	E. NE.	NE....	45	35	25	34.7	N. 62 E..	10	10	10	......	.56
.910	.606	.836	.784	NE.	E. NE.	N.	35	12	2	15.7	N. 48 E..	10	10	0	......	.08
.820	.465	.794	.693	N. NE...	N. NE.	E.... .	4	12	2	5.6	N. 29 E..	0	1	0	......	....
.704	.422	.606	.577	S	N.	SW. ..	4	12	4	2.0	N. 29 W..	3	5	1	......	....
.812	.448	.740	.667	SW.	W. SW	S......	12	35	2	15.7	S. 60 W..	7	10	10	......	....
.675	.641	.790	.702	W. SW..	NE....	NE....	12	12	12	4.6	N. 26 E..	8	10	10	......	....
.847	.692	.932	.824	NE.	N.	N. ..	4	12	12	9.0	N. 6 E..	10	9	10	......	.02
.861	.641	.932	.811	N.	N. NE.	S......	12	12	2	9.3	N. 12 E..	8	3	6	......	.02
.847	.925	.850	.874	N.	N.	S.... .	12	25	2	11.7	North....	10	10	10	......	.03
.691	.484	.798	.658	N.	NW...	S......	25	35	2	17.7	N. 27 W..	10	3	0	.....	.47
.798	.642	.769	.736	S	SW. ..	SE.. ..	25	25	4	16.0	S. 18 W..	10	7	4	......	....
.865	.512	.790	.722	W..	N.	N.	12	35	12	16.3	N. 14 W..	8	2	4	......	....
.767	.475	.798	.680	W. NW.	NW...	NW...	35	35	12	26.8	N 55 W..	8	5	10	......	....
.646	.576	.461	.561	W..	W.....	NW...	25	25	35	26.2	N. 72 W..	10	6	4	.....	....
.703	.441	.535	.580	SW.	W.....	S......	25	45	4	22.0	S. 71 W..	10	3	5	......	....
.653	.396	.502	.517	W.......	N.	SE.. ..	12	12	4	4.3	N. 45 W..	10	0	0	......	....
.776	.501	.708	.662	W. SW..	N ..	S	4	12	2	3.1	N. 23 W..	5	*3	0	.....	....
.780	.427	.463	.557	W. NW..	NW...	NW...	4	4	4	3.4	N. 66 W..	7	10	0	......	....
.731	.548	.670	.650	W..	N . .	N. NE.	4	25	4	9.7	N. 5 W..	5	10	0	......	....
.812	.675	.681	.723	E.	E. NE.	NE....	4	45	35	27.3	N. 59 E..	4	10	10	......	....
.809	.647	.687	.714	E. NE...	E. NE.	E.	12	12	12	11.8	N. 75 E..	10	3	0	......	....
.761	.618	.772	.717	E. SE. ..	E.	SE.....	4	12	4	6.3	S. 77 E..	10	5	0	......	....
.747	.490	.618	.618	S.........	N.	S	4	12	4	1.3	North. ..	10	10	0	......	....
.825	.653	.723	.734	SW.	E. NE.	E. NE.	4	12	4	4.2	N. 75 E..	10	10	10	......	....
.790	.727	.895	.804	SE..	SW...	S	25	4	2	9.0	S. 33 E..	8	10	6	......	....
.843	.843	.838	.841	S.... ...	NW...	W.....	25	12	4	6.9	S. 37 W..	6	10	3	......	.15
.780	.582	.738	.700	....	....	....	....	...	....	6.2	N. 26 E..	8.2	7.0	4.4	......	1.44

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit. Expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	29.086	....	29.195	29.141	59	....	51	64	....	53	58.5	66	45	.433	....	.348	.390
2	29.260	29.365	29.440	29.355	49	54	51	51	57	55	54.3	57	42	.321	.378	.321	.340
3	29.593	29.627	29.614	29.611	46	51	50	50	59	53	54.0	60	41	.258	.269	.321	.283
4	29.702	29.674	29.685	29.687	48	58	55	50	66	60	58.7	68	38	.309	.376	.367	.351
5	29.625	29.653	29.696	29.658	53	54	52	57	64	56	59.0	68	46	.350	.285	.335	.323
6	29.850	29.833	29.847	29.843	48	54	49	51	60	52	54.3	60	43	.296	.338	.308	.314
7	29.880	29.844	29.757	29.827	48	51	50	51	57	52	53.3	27	37	.296	.295	.334	.308
8	29.820	29.705	29.662	29.729	49	54	56	51	63	58	57.3	67	42	.321	.298	.422	.347
9	29.622	29.580	29.591	29.598	52	59	58	58	74	66	66.0	74	45	.309	.300	.376	.328
10	29.644	29.622	29.621	29.629	57	67	62	61	80	70	70.3	81	48	.412	.487	.449	.449
11	29.600	29.568	29.534	29.567	59	64	58	62	70	61	64.3	71	52	.461	.516	.443	.473
12	29.627	29.661	29.895	29.728	57	60	61	60	67	64	63.7	68	49	.425	.425	.497	.449
13	29.773	29.788	29.834	29.798	58	65	64	61	71	68	66.7	79	51	.443	.537	.543	.508
14	29.815	29.801	29.661	29.759	60	63	64	63	70	73	68.7	81	52	.478	.482	.476	.479
15	29.580	29.584	29.677	29.614	64	67	58	74	84	63	73.7	84	55	.462	.434	.416	437
16	29.874	29.813	29.685	29.791	47	48	54	53	59	60	57.3	68	45	.244	.190	.338	.257
17	29.471	29.376	29.405	29.417	53	56	56	55	63	58	58.7	63	46	.376	.356	.422	.385
18	29.412	29.443	29.421	29.425	55	61	62	58	72	66	65.3	73	48	.393	.390	.502	.428
19	29.409	29.448	29.501	29.453	60	63	61	63	71	66	66.7	76	52	.478	.469	.470	.472
20	29.622	29.556	29.537	29.572	60	61	57	64	64	60	62.7	65	52	.465	.497	.426	.463
21	29.599	29.611	29.600	29.603	54	61	55	59	65	59	61.0	67	47	.351	.483	.380	.405
22	29.602	29.551	29.612	29.588	55	60	56	58	65	58	60.3	67	47	.393	.451	.422	.422
23	29.694	29.740	29.773	29.736	53	58	55	57	64	61	60.7	66	44	.350	.403	.354	.369
24	29.873	....	29.856	29.865	56	....	57	61	....	60	60.5	69	47	.383	....	.426	.405
25	29.921	29.883	29.820	29.875	55	60	62	58	69	66	64.3	73	44	.393	.398	.502	.431
26	29.873	29.835	29.798	29.835	57	64	65	61	71	70	67.3	76	50	.412	.503	.550	.488
27	29.884	29.792	29.800	29.825	59	66	63	63	79	74	72.0	81	52	.447	.465	.429	.447
28	29.791	29.725	29.675	29.730	63	74	67	69	83	75	75.7	83	55	.495	.718	.554	.589
29	29.694	29.599	29.590	29.628	62	72	68	68	84	75	75.7	84	56	.476	.623	.591	.563
30	29.621	29.594	29.590	29.602	68	74	72	73	84	78	78.3	85	65	.618	.704	.704	.675
Means.....	29.661	29.652	29.646	29.650	55.5	60.6	58.3	59.5	69.1	63.0	63.9	....	....	.395	.431	.424	.419

of the north and northwestern lakes, at Charlotte, New York.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.727	......	.864	.796	SW.	....	SW....	60	....	25	42.5	S. 45 W.	5	....	10	......	.35
.859	.812	.743	.865	SW......	W....	NW...	45	35	35	28.7	S. 85 W.	10	10	10	......	....
.716	.537	.798	.684	N.	N. ...	S......	35	45	2	26.0	North ...	7	5	1	......	.03
.856	.588	.708	.717	N. NW. .	N. NE.	S.	12	12	4	6.1	North ...	10	4	5	......	....
.752	.479	.747	.659	SW......	N. NE.	N.	4	12	35	14.3	N. 2 E..	6	3	10	......	....
.790	.653	.794	.746	N........	N.	NW...	35	25	12	23.0	N. 7 W.	4	4	3	......	.30
.790	.634	.861	.762	N......	N. NW	NW...	25	35	25	27.0	N. 23 W..	6	10	10	......	....
.859	.519	.876	.751	N........	NW...	NW...	35	25	4	19.7	N. 20 W.	9	8	9	......	.09
.641	.358	.588	.529	NW.....	NW...	NW...	45	45	12	34.0	N. 45 W.	10	5	6	......	....
.769	.476	.613	.619	W. SW..	N.	S......	12	12	4	3 9	N. 73 W.	8	10	4	......	....
.828	.704	.825	.786	S. SW...	E.	N.	12	4	4	2.4	S. 5 W.	10	10	10	......	....
.822	.642	.833	.766	N. NE...	N.	NW...	2	12	2	5.1	N. 2 W.	9	7	10	.....	.16
.825	.708	.793	.775	N........	N. ...	S......	4	4	2	2.0	North...	9	3	2	......	....
.831	.658	.588	.692	SW.	N.	SW. ..	4	4	12	4.5	S. 57 W.	10	8	5	......	....
.551	.372	.723	.549	NW.....	NW...	NW...	45	45	4	31.3	N. 45 W.	10	10	2	......	....
.606	.381	.653	.547	N. NE...	N. NE.	N.....	35	12	4	17.0	N. 21 E..	10	3	10	......	....
.869	.619	.876	.788	NE.....	E. NE.	S......	12	12	2	7.5	N. 60 E..	10	10	3	......	.35
.816	.497	.876	.730	W. NW.	N. NE.	S.......	4	4	2	1.3	N. 35 W.	10	10	10	......	.05
.831	.618	.735	.728	SE......	N.	SE....	12	12	12	6.0	S. 73 E..	10	7	10	......	....
.780	.833	.822	.812	SE......	S.. ...	NE....	35	25	12	17.7	S. 39 E..	10	10	10	. ...	.10
.703	.783	.761	.749	S.. ...	NE....	SE.. ..	25	12	2	6.7	S. 29 E..	10	10	10	......	....
.816	.731	.876	.808	S. SW. ..	SW. ..	S......	25	12	4	13.3	S. 27 W.	9	8	2	......	.08
.752	.676	.659	.696	NW.	NW...	NW...	45	25	35	35.0	N. 45 W.	9	7	10	......	....
.713	......	.822	.768	NW.	....	S......	12	....	2	3 7	N. 52 W.	7	....	0	......	....
.816	.564	.786	.722	N.......	N. NE.	S......	2	12	2	4.0	N. 23 E..	4	0	0	......	....
.769	.663	.751	.728	S..	E.	S......	4	35	4	12.0	S. 13 E..	10	7	6	......	....
.776	.470	.511	.586	SE......	SE.. .	SE.....	12	35	12	16.3	S. 45 E..	10	2	1	......	....
.700	.636	.639	.658	S........	S......	S......	35	35	2	24.0	South....	5	3	1	......	....
.695	.535	.681	.637	SE......	S. SE..	S.......	12	25	35	23.2	S. 15 E..	5	3	5	......	....
.761	.605	.734	.700	S........	S......	SE.. ..	45	60	35	41.3	S. 8 E..	6	4	4	......	....
.767	.598	.751	.709	....	....	....	....	....	....	3.5	N. 57 W.	8.2	6.5	6.0	......	1.51

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
August 1	29.765	29.737	29.688	29.730	65	72	66.5	69	78	73.5	73.5	79	61	.564	.704	.556	.608
2	29.753	29.767	29.703	29.741	64	71	67	70	78.5	73	73.8	79	66	.516	.657	.581	.585
3	29.775	29.731	29.647	29.718	64	72	69	70.5	84	78	77.5	85	64	.509	.623	.588	.570
4	29.687	29.686	29.637	29.670	68	76	72	76	87	81	81.3	88	75	.577	.748	.663	.663
5	29.611	29.606	29.612	29.610	73	72	70	81	81	77	79.7	82	75	.703	.663	.639	.668
6	29.806	29.803	28.846	29.818	62	66	62	68.5	74	69	70.5	77	65	.469	.532	.462	.488
7	29.914	....	29.626	29.770	60	....	69	67.5	..	78	72.7	78	64	.418	....	.588	.503
8	29.629	29.594	29.477	29.567	73	76	73	79	85	80	81.4	85	75	.730	775	.717	.741
9	29.414	29.367	29.372	29.384	70	73	68	80	84.5	76	79.5	83	73	.598	.683	.577	.619
10	29.615	29.647	29.625	29.629	61	68	65	68	78	72.5	72.5	79	65	.443	.550	.517	.503
11	29.701	29.607	29.484	29.597	59	74	70	65	85	80	76.7	86	60	.420	.691	.598	.569
12	29.652	29.669	29.671	29.664	65	71	61	72.5	80	72	74.8	81	69	.517	.637	.390	.515
13	29.889	29.841	29.771	29.834	55	63	57	60.5	72	65	65.8	73	55	.360	.455	.359	.591
14	29.729	29.598	29.528	29.618	56	66	64	64.5	76	70	70.2	77	55	.336	.505	.516	.452
15	29.581	29.651	29.709	29.647	59	60	56	66	70.5	65	67.2	73	63	.407	.378	.330	.372
16	29.919	29.944	29.959	29.941	52	58	57	59	66	64	63.0	69	53	.296	.376	.373	.348
17	30.065	29.973	28.909	29.982	50.5	64	58	57	71	66	64.7	72	50	.281	.503	.376	.387
18	28.869	29.818	29.746	29.811	56	64	61	64	76	70	70.0	77	59	.343	.436	.416	.398
19	....	....	....	....	...	....	..	....	....	....	......	....	....	....	....	....	....
20	....	....	....	....	....	....	....	....	....	....	......	....	....	....	....	....	....
21	....	....	....	....	....	....	....	....	....	....	......	....	....	....	....	....	....
22	29.583	29.502	29.428	29.504	66	70	69	72.5	76.5	75	74.7	78	58	.552	.646	.628	.608
23	29.600	29.774	29.839	29.738	63	61	53	68.5	66	62.5	65.7	75	60	.502	.470	.277	.416
24	30.105	30.087	29.960	30.051	45	51	51	51	62.5	57	56.8	65	45	.220	.222	.295	.245
25	....	....	....	....	...	....	....	....	....	...	......	....	....	....	....	...	....
26	....	....	....	....	..	....	....	....	....	....	......	....	....	....	...	....	....
27	29.661	29.630	29.560	29.617	65	69	68	71.5	75	74	73.5	76	68	.530	.628	.604	.587
28	29.535	29.463	29.405	29.468	65	67	66	70	73	71	71.3	74	67	.550	.581	.572	.568
29	29.645	29.699	29.737	29.694	55.5	56	51	62.5	65	61	62.8	70	58	.348	.330	.242	.306
30	29.995	29.945	29.857	29.932	45	57	51	50.5	66.5	59.5	58.8	67	43	.227	.339	.262	.276
31	29.840	29.708	29.505	29.684	54	65	64	59	77	73.5	69.8	78	50	.351	.457	.469	.425
Means.....	29.743	29.714	29.665	29.708	60.0	66.5	63.0	67.0	75.8	70.9	71.1	....	....	.462	.543	.484	.492
Sept. 1	29.285	29.193	29.246	29.241	65	67	58.5	71	72	64	69.0	75	60	.537	.595	.418	.517
2	29.427	29.624	29.636	29.562	45	48	48.5	50	55	57	54.0	62	45	.234	243	.229	235
3	29.881	29.857	29.825	29.854	41	55	49	46	61	53.5	54.2	62	39	.192	.354	.262	.269
4	29.830	29.844	29.763	29.812	54	68	64	61	79	75	71.7	80	50	.325	.537	.449	.437
5	29.836	29.729	29.690	29.752	62	71	67	71	83	75	76.3	84	65	.436	.597	.554	.529
6	29.708	29.725	29.636	29.689	67	68	64	75	74.5	69	72.8	75	66	.554	.597	.529	.560
7	29.666	29.610	29.573	29.616	67	72	70	72.5	80	76	76.2	80	65	.588	.677	.652	.639
8	29.565	29.555	29.651	29.590	67.5	64	60	74	75.5	68	72.5	78	65	.586	.442	.411	.479
9	29.906	29.875	29.844	29.875	56	64	51	62	76	65	67.7	80	51	.369	.436	.189	.331
10	....	....	....	....	....	....	....	...	..	....	......	...	....	...	...	....	...
11	....	....	....	....	...	....	....	....	....	....	......	....	....	...	...	....	....
12	....	....	....	....	..	...	....	...	..	.. .	......	....	....	....	....	....	...
13	....	....	....	....	...	....	....	....	....	....	......	....	....	...	...	....	....
14	....	....	....	....	....	...	....	...	..	....	....	....	....	....	...	...	....
15	29.897	29.847	29.845	29.863	54	61	57	58	66	62	62.0	67	53	.365	.470	.399	.411
16	29.983	29.945	29.900	29.943	54	57	55	59	64.5	60	61.2	65	55	.351	.366	.367	361
17	29.865	29.784	29.701	29.783	51	66	64	55	74	70	66.3	74	50	.321	.53[illegible]	.516	.156
18	29.566	29.535	29.586	29.562	65	68	65	72.5	75	70	72.5	76	67	.517	591	.550	553
19	29.709	29.751	29.799	29.753	61	65	51	67	71	66.5	68.2	71	63	.457	537	.169	.398
20	29.875	29.821	29.789	29.828	55	63.5	56	59	70.5	62	68.3	71	55	.380	.492	.359	.414
21	20.955	29.992	29.935	29.961	54	60	53	59	68	60	62.3	68	55	.351	.411	.310	.357
22	29.973	28.867	29.849	29.896	50	70	60	54.5	77	69	66.8	78	48	.301	.639	398	.466
23	29.831	29.642	29.586	29.686	59	70	62	66	79	71	72.0	80	63	.407	.612	.436	.485
24	29.589	29.649	29.738	29.659	56	62	48	60	68	54.5	60.8	69	52	.396	.476	.249	.374
25	29.849	29.820	29.763	29.810	41	58	52	45.5	66	58	56.5	66	40	.198	376	.309	.291
26	29.845	29.814	29.765	29.801	49	61	54	54	69	60	61.0	69	49	.282	430	.338	.350
27	29.848	29.789	29.762	29.799	49	64	55.5	53	71	63	62.3	72	48	.295	.503	.342	380
28	29.749	29.645	29.614	39.676	58	67	57	64	74	64	67.3	75	58	.403	.568	.373	.448
29	29.629	29.649	29.695	29.658	58	57	53	63	62	59	61.3	68	56	.416	.399	.323	.379
30	29.849	29.879	29.922	29.883	44	45	44	48	51	46	48.3	58	43	.236	.220	.262	.239
Means.....	28.764	29.738	29.724	29.742	55.3	62.8	56.7	60.8	70.4	63.9	65.0	....	....	.379	.484	.376	.413

of the north and northwestern lakes, at Sackett's Harbor, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.796	.734	.674	.734	S.SW	SW	S	2	12	4	5.7	S. 33 W.	0	2	1	......	....
.704	.675	.716	.698	S by W	SW	Calm	4	12	0	5.2	S. 37 W.	8	7	0	......	....
.683	.535	.613	.610	E.	SW	S	2	4	2	1.6	S. 10 W	4	6	2	......	....
.644	.584	.627	.618	S.	SW	Calm	12	12	0	7.3	S. 23 W.	5	4	6	......	....
.665	.627	.689	.660	S	SW	W	12	25	4	12.3	S. 36 W.	4	5	6	......	....
.674	.634	.653	.654	NE	SW	E.	25	12	2	4.8	N. 51 E.	5	2	3	......	....
.621	..	.613	.617	SE		S	2	...	35	18.1	S. 2 E.	10	....	9	......	....
.738	.644	.701	.694	W	SW	SW	12	4	2	5.5	S. 75 W.	8	3	5	......	....
.585	.616	.644	.615	S.SW	SW	NW	25	35	45	22.6	S. 76 W.	10	7	2	......	....
.617	.574	.648	.623	N.	W	W	12	25	12	13.0	N. 72 W.	2	5	4	......	.06
.680	.574	.585	.613	S.	SW	S	2	25	12	12.0	S. 29 W	2	5	6	......	...
.648	.623	.497	.589	W.	W.	NE	35	35	35	17.2	N. 63 W.	1	3	0	......	0.24
.683	.582	.582	.616	NE	NE	SE	12	4	2	5.3	N. 52 E.	0	4	3	....	....
.554	.563	.704	.607	S	SW	W	12	45	35	26.5	S. 57 W	8	10	10	......	....
.636	.507	.535	.559	N.NE.	W	N.	35	4	35	22.7	N. 8 E.	3	1	8	......	0.24
.592	.588	.625	.602	N.NW	W	S	12	25	4	10.0	N. 76 W.	1	6	0	......	....
.605	.663	.588	.619	S	SW	S	4	12	4	6.2	S. 28 W.	0	4	1	......	....
.575	.486	.570	.544	S	SW	S	35	35	2	22.0	S. 22 W.	7	4	1	......	....
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
.692	.708	.724	.708	S	SW	SW	4	35	25	21.0	S. 42 W	10	8	8	......	0.20
.721	.735	.490	.649	W.	N.	N	25	35	25	21.7	N. 23 W.	3	9	2	......	0.42
.599	.393	.631	.539	NE	NW	E.	12	2	2	4.5	N. 43 E.	0	0	0	......	0.10
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
.688	.724	.720	.711	S.	Calm	E.	12	0	2	4.1	S. 9 E.	10	10	10	......	....
.751	.716	.754	.740	Calm	SW	W	0	25	12	11.5	S. 60 W.	10	10	2	......	0.30
.615	.535	.452	.534	N.	N.	NE	35	12	35	25.3	N. 19 E.	4	5	4	......	0.08
.618	.522	.515	.552	Calm	SW	S	0	12	2	4.5	S. 39 W.	0	0	0	......	...
.703	.49	.569	.588	S	SW	S	4	25	35	19.7	S. 17 W.	0	0	5	......	....
.658	.601	.620	.626	......	......	......	....	....	....	5.7	S. 68 W.	4.4	4.8	3.7	......	1.64
.708	.758	.701	.722	S	SW	N by W	45	60	45	22.3	S. 50 W.	8	10	8	......	.40
.646	.561	.492	.566	N.	NW	N	45	35	12	28.3	N. 17 W.	10	6	0	......	.60
.617	.639	594	.623	E	SW	S	2	12	2	4.1	S. 32 W.	0	4	2	......	...
.606	.542	.518	.555	S	SW	SW	25	35	35	29.7	S. 34 W.	0	0	0	......	....
.576	.529	.639	.581	S	S	S	12	25	2	13.0	South	6	5	3	......	....
.639	.700	.747	695	SW	SW	NE	35	4	12	9.0	S. 45 W.	10	10	10	......	. ..
.737	.661	727	708	S	SW	SW	4	25	2	10.0	S. 40 W	10	10	8	...	.68
.700	.502	.601	.601	S	SW	W	35	45	35	31.5	S. 45 W.	8	10	5	......	.66
.665	.486	.307	.486	N.	W	S	12	4	2	3.7	N. 22 W.	0	3	4	......	.10
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	.28
......	......	......	......	......	......	......	....	....	....	....	......	....	....	....	......	....
.756	.735	.718	.736	Calm	N	NE	0	12	35	14.7	N. 34 E.	4	10	2	......	....
.703	.603	.708	.671	NE	NE	SE	25	4	2	9.7	N. 49 E.	10	7	0	......	06
.743	.634	.704	.694	NE	SE	SE	4	4	4	2.9	S. 71 E.	0	6	10	......	....
.648	.681	.751	.693	S	S	S	60	45	25	13.3	South	3	9	10	......	....
.690	.708	.261	.553	NW	W	NW	12	35	25	22.3	N. 67 W.	2	7	10	......	.04
.761	.660	.665	.695	NE	SW	S	4	12	2	3.2	S. 36 W.	10	1	0	......	....
.703	.601	.599	.634	NE	NE	SE	12	4	2	5.3	N. 52 E.	2	0	0	......	....
.709	.689	.564	.654	S	S	S	2	12	4	6.0	South	2	0	0	......	....
.636	.618	.576	.610	S	S	S	12	12	25	16.3	South	0	2	0	......	....
.765	.695	.587	.682	N	N.	S	35	25	2	19.3	North	10	3	0	......	....
.650	.568	.641	.626	S	SW	S	4	12	2	5.7	S. 30 W.	0	1	0	......	.10
.674	.607	.653	.645	S	SW	S	12	25	2	12.0	S. 29 W.	1	0	0	......	....
.733	.663	.593	.663	Calm	SW	S	0	4	2	1.9	S. 30 W.	0	2	4	......	....
.675	.677	.625	.659	S	SW	Calm	4	12	0	5.0	S. 34 W.	8	2	0	......	....
.723	.718	647	.696	S	NE	NE	2	25	35	19.3	N. 46 E.	7	10	9	......	....
.704	.590	.843	.712	NE	NE	NE	25	35	25	28.3	N. 45 E.	8	9	3	.....	.04
.687	.634	.618	.646	......	......	......	....	....	....	3.6	S. 40 W.	4.7	5.1	3.5	......	2.96

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
					°	°	°	°	°	°	°	°	°				
1862.																	
October 1	29.948	29.889	29.841	29.893	42.5	52	52	46	56	57	53.0	57	41	.213	.335	.322	.290
2	29.818	29.745	29.739	29.767	55	62.5	62	60	67	68	65.0	68	55	.367	.506	.476	.449
3	29.765	29.804	29.717	29.762	61	63.5	66	65	69	69	67.7	69	61	.483	.512	.599	.531
4	29.583	29.400	29.518	29.500	67	69	55	71	76.5	63	70.2	77	60	.608	.608	.327	.514
5	29.974	29.995	29.971	29.980	46	48	51.5	50.5	57	58	55.2	62	46	.252	.217	.295	.255
6	29.932	29.647	29.497	29.702	41	53	52	45	62	61	56.0	62	40	.205	.284	.269	.253
7	29.512	29.521	29.481	29.505	60	66.5	68	65.5	73	72	70.2	73	56	.445	.563	.631	.546
8	29.535	29.517	29.475	29.509	67	71	67	79	81	77	77.3	82	69	.568	.624	.527	.573
9	29.699	29.831	29.824	29.785	57	64.5	54	65	73	60	66.0	76	58	.359	.493	.338	.397
10	29.875	29.718	29.526	29.706	53	52.5	49	58	58	53	56.3	60	50	.336	.322	.295	.318
11	29.734	29.792	29.764	29.763	43	46	47	47	53	51	50.3	53	42	.225	.219	.270	.238
12	29.908	29.832	29.774	29.838	38	51	45.5	41.5	57	50.5	49.7	57	37	.183	.295	.239	.239
13	29.788	29.684	29.639	29.704	42	52	48	46	59	53	52.7	59	41	.215	.296	.269	.260
14	29.682	29.693	29.756	29.710	50.5	55	45	54.5	61.5	49	55.0	62	15	.314	.347	.247	.303
15	29.984	29.953	29.881	29.939	36	38.5	37	40	44	41	41.7	47	35	.160	.161	.168	.163
16	29.771	29.610	29.546	29.642	37.5	45	48	41	50	51.5	47.5	52	35	.179	.234	.289	.234
17	29.632	29.715	29.802	29.649	48.5	50	46.5	52.5	56	53	54.8	56	46	.288	.282	.231	.267
18	30.022	29.959	29.777	29.919	40	50	47	43	57	53	51.0	57	39	.208	.268	.214	.240
19	29.551	29.584	29.533	29.561	47.5	45.5	45	54	50	51	51.7	57	46	.243	.245	.220	.236
20	29.846	29.830	29.702	29.793	33	38	37	37	44	40	40.3	51	33	.136	.151	.181	.156
21	29.430	29.330	29.215	29.325	41	44.5	47	48	49	50	49.0	51	36	.166	.234	.283	.228
22	29.151	29.172	29.453	29.259	46	44	39.5	50	47	45	47.3	50	40	.258	.249	.171	.226
23	29.806	29.953	29.964	29.908	35	35.5	35	40	42	40	40.7	44	35	.139	.123	.139	.134
24	29.914	29.690	29.637	29.747	38	46	48	43.5	53.5	56	51.0	56	33	.157	.212	.230	.199
25	29.990	30.033	30.054	30.026	39	37	34	43	43	39	41.7	56	35	.186	.142	.139	.156
26	30.041	29.894	29.710	29.883	31.5	33	32	34	36	35	35.0	38	31	.148	.145	.142	.146
27	29.523	29.482	29.570	29.525	31	35	30	32	39	33	34.7	39	30	.162	.153	.132	.149
28	29.800	29.821	29.756	29.792	34	40	39	37	43.5	43	41.2	44	27	.157	.202	.186	.182
29	29.741	29.733	29.756	29.743	38.5	44	45	41.5	48	48	45.8	49	38	.194	.236	.260	.230
30	29.916	29.798	29.650	29.788	39	45.5	47	42	49	54	48.3	54	38	.199	.258	.231	.229
31	29.730	29.613	29.567	29.637	48	55	52	52.5	63	61	58.8	64	49	.276	.327	.269	.291
Means.....	29.763	29.717	29.680	29.718	44.7	49.4	48.7	49.0	55.4	52.7	52.4	....	....	.259	.298	.278	278
Nov. 1	29.729	29.693	29.609	29.677	48	55	44.5	53	63	50	55.3	63	47	.269	.327	.221	.272
2	29.577	29.470	29.267	29.445	51	56	49	57	63	54	58.0	64	46	.295	.356	.282	.311
3	29.343	29.504	29.791	29.546	40	39	33	43.5	45	37	41.8	54	34	.202	.160	.136	.166
4	30.072	29.984	29.886	29.981	29	36	35	32	41	39.5	37.5	42	29	.126	.147	.145	.139
5	29.711	29.576	29.488	29.592	38	47	44	42	52	48	47.3	52	35	.177	.257	.236	.223
6	29.739	29.734	29.722	29.732	31	30	29	32	31	31	31.3	42	26	.162	.155	.137	.151
7	29.879	29.816	29.774	29.823	22	24.5	24	25.5	28	26	26.5	31	20	.078	.092	.106	.092
8	29.784	29.805	29.809	29.799	23.5	29	30	26	32	31	29.7	32	20	.098	.126	.155	.126
9	29.785	29.710	29.682	29.726	30.5	30.5	34	32	34	37	34.3	37	27	.153	.130	.157	.147
10	29.849	29.887	29.907	29.881	35	38	32	40	43	36	39.7	43	33	.139	.164	.129	.144
11	29.884	29.682	29.525	29.697	29	44	43	32.5	52.5	51	45.3	53	28	.120	.177	.173	.157
12	29.666	29.788	29.746	29.733	46	41	39	50	45.5	43.5	46.3	54	40	.258	.198	.179	.212
13	29.818	29.916	29.898	29.877	38	38	37	43	44.5	43	43.5	45	38	.164	.144	.142	.150
14	29.896	29.870	29.951	29.906	36	43	35	42	48	41	43.7	48	38	.134	.212	.126	.157
15	30.450	30.533	30.521	30.501	17.5	24.5	23	20	27	24.5	23.8	39	11	.068	.103	.106	.092
16	30.556	30.390	30.235	30.394	17	30	34	20	36	38	31.3	38	10	.060	.098	.144	.101
17	30.034	29.984	30.041	30.019	40	44	41	44	46.5	45	45.2	27	34	.195	.255	.205	.218
18	30.189	30.104	29.896	30.063	34.5	37	38	37	41	42	40.0	43	33	.167	.168	.177	.170
19	29.693	29.518	29.436	29.549	44.5	47	43	48	50	45.5	47.8	50	39	.247	.283	.245	.258
20	29.304	29.297	29.485	29.362	38	37	29	41	39.5	31	37.2	44	27	.190	.188	.137	.172
21	29.615	29.613	29.565	29.598	25.5	27	30	28	30	32	30.0	32	25	.109	.113	.144	.122
22	29.610	29.560	29.535	29.568	29	31	30	31.5	33.5	32	32.3	34	27	.131	.145	.144	.140
23	29.723	29.741	29.733	29.732	21.5	24	26	26	27.5	28	27.2	31	20	.080	.089	.117	.095
24	29.801	29.745	29.678	29.741	23	32.5	31	25	35.5	34	31.5	36	21	.100	.145	.139	.128
25	29.662	29.607	29.580	29.616	30.5	36.5	32	33	42	35	36.7	43	29	.141	.144	.142	.142
26	29.545	29.523	29.485	29.518	30	32	31	33	35	34	34.0	35	28	.132	.142	.139	.138
27	29.563	29.515	29.405	29.494	31	33.5	31	33	36	34	34.3	36	30	.151	.160	.139	.150
28	29.315	29.288	29.320	29.308	30.5	34	34	33	38	37	36.0	38	30	.141	.144	.157	.147
29	29.513	29.488	29.523	29.508	32.5	33	31	34.5	37.5	33.5	35.2	38	30	.158	.130	.145	.144
30	29.685	29.708	29.640	29.678	30	35	34	31.5	38	37	35.5	38	26	.150	.165	.157	.157
Means.....	29.766	29.735	29.705	29.735	32.4	36.3	34.2	35.6	40.5	37.6	37.9	....	....	.153	.170	.162	.161

of the north and northwestern lakes, at Sackett's Harbor, New York.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.660	.747	.692	.699	NE	NE	NE	25	12	2	13.0	N. 45 E.	10	10	10	......	....
.708	.764	.695	.722	S	S	S	12	25	4	13.7	South	10	10	10	......	...
.783	.723	.846	.784	NE	NE	E	2	12	2	5.1	N. 50 E.	10	10	8	......	.20
.802	.666	.568	.679	S	S	W	25	60	75	38.0	S. 41 W.	5	9	8	......	.24
.683	.465	.612	.587	NW	NW	NW	35	25	12	24.0	N. 45 W.	2	0	0	......	....
.684	.511	.502	.566	S	S	S	4	45	60	36.3	South	0	10	10	......	....
.708	.694	.804	.735	S	SW	S	25	12	25	19.7	S. 3 W.	10	10	2	......	.10
.677	.590	.569	.612	S	SW	S	12	25	25	19.0	S. 18 W.	2	3	5	......	.24
.582	.607	.653	.614	NW	W	SW	12	4	2	5.2	N. 63 W.	10	10	10	......	....
.698	.669	.733	.700	NE	NE	NE	12	35	35	27.3	N. 45 E.	10	10	10	......	.06
.698	.544	.722	.655	N	N	S	12	4	2	4.7	North	10	5	3	......	.56
.699	.634	.649	.661	E	W	NE	4	12	2	2.3	N. 78 W	8	2	3	......	.08
.691	.592	.667	.650	S	W	S	4	2	2	2.1	S 19 W.	10	8	3	......	....
.740	.635	.710	.695	S	SW	NE	2	12	45	10.7	N. 47 E.	10	5	10	......	...
.645	.560	.653	619	NE	NE	NE	35	12	12	19.7	N. 45 E.	10	4	6	......	....
.695	.646	.758	.699	E	S	S	4	25	4	10.0	S. 8 E.	10	10	10	......	....
.730	.627	.574	.644	SW	SW	NW	35	35	25	24.7	S. 65 W.	10	6	10	......	.36
.750	.577	.606	644	S. SE	SW	S	2	12	25	12.0	S. 12 W.	2	3	4	......	.20
.583	.679	.590	.617	S	W	W	45	35	45	30.8	S. 61 W.	3	8	10	......	....
.619	.522	.732	.624	NE	SW	S	25	12	2	3.9	N. 52 E.	10	4	10	......	.10
.494	.673	.786	.651	S	S	S	45	45	25	38.3	South	8	10	10	......	....
.716	.772	.570	.686	W	W	NW	45	75	45	51.7	N. 78 W.	10	10	10	......	.50
.557	.461	.557	.525	N. NW	W. by N	W	25	25	2	15.3	N. 52 W.	8	6	4	......	.20
.555	.518	.512	.528	S	S	S	35	60	45	46.7	South	9	10	10	......	...
.669	.511	.557	.579	NW	N. NW.	N. NE	25	12	25	17.7	N. 14 W.	10	10	5	......	.12
.760	.705	.698	.721	NE	NE	NE	35	35	45	38.3	N. 45 E.	10	10	10	......	....
.896	.636	.703	.745	NE	N by W	S	12	12	2	6.3	N. 19 E.	10	9	8	......	.52
.712	.713	.669	.698	S	S	SE	4	4	4	3.7	S. 14 E.	10	10	8	......	.06
.741	.704	.777	.741	SE	SW	W	2	25	45	21.3	S. 72 W.	10	8	9	......	.12
.744	.745	.552	.689	NE	S	S	12	4	25	7.3	S. 22 E.	10	8	5	......	.06
.696	.568	.502	.589	S	S. SW	SW	2	12	25	12.7	S. 36 W.	9	4	2	......	....
689	.627	.652	.656	....	....	....	....	....	....	5.5	S. 41 W.	8.2	7.5	7.9	......	3.72
.667	.568	.614	.616	S	SW	Calm	2	12	0	4.5	S. 39 W.	0	0	0	......	....
.634	.619	.674	.642	S	SW	NE	4	2	12	2.6	N. 66 E.	5	6	7	......	...
.713	.533	.619	.6 2	W	NW	N	60	35	45	36.5	N. 51 W.	10	10	5	......	.28
.694	.567	.595	.619	NE	NW	S	4	4	2	1.2	North	6	5	2	......	....
.661	.669	.704	.675	S	SW	NW	45	35	25	22 3	S. 39 W.	5	10	10	......	....
.836	.893	.788	.839	N	N	NE	35	25	25	26.5	N. 13 E.	10	10	8	......	.08
.568	.509	.754	.640	NE	NE	NE	45	60	75	60.0	N. 45 E.	10	10	10	......	....
.694	.694	.893	.760	NE	NE	NE	35	4	2	13.7	N. 45 E.	10	10	8	......	.04
.845	.664	.712	.740	NE	NW	NW	12	12	25	13.0	N. 27 W.	10	10	7	......	.02
.557	.587	.610	.585	NW	W	NE	12	4	2	5.0	N. 48 W.	10	6	2	......	....
.649	.447	.461	.519	E by S	S	S	2	35	60	31.8	S. 1 E.	2	8	10	......	....
.716	.650	.632	.666	NW	SW	Calm	25	12	0	9.3	N. 71 W.	10	10	10	......	....
.587	.490	.511	.529	W	W	W	45	45	45	45.0	West	8	10	10	......	.12
.500	.631	.488	.539	S	SW	NW	25	35	35	18.5	S. 63 W.	10	10	2	......	....
.629	.703	.807	.713	NE	NE	NE	35	25	25	28.3	N. 45 E.	0	0	0	......	....
.556	.462	.628	.548	NE	S	S	4	2	4	1.4	S. 41 E.	6	10	3	......	....
.677	.807	.684	.723	S	S	N	35	4	2	12.3	South	10	10	10	......	.20
.759	.653	.661	.691	NE	S	Calm	2	2	0	C.5	S. 67 E.	9	10	10	......	.10
.740	.786	.803	.776	S	Calm	NE	4	0	12	3.2	N. 62 E.	10	10	10	......	.16
.738	.773	.781	.766	NE	NE	N	35	35	25	29.8	N. 34 E.	10	10	10	......	1.08
.711	.675	.794	.727	E	Calm	E	2	0	4	2.0	East	10	10	10	......	.12
.740	.756	.794	.763	E	NE	NE	2	4	25	10.0	N. 48 E.	8	10	10	......	....
.574	.593	.768	.645	NW	W	W	25	35	25	26.5	N. 77 W.	10	10	2	......	.02
.746	.701	.712	.719	SE	S	S	2	4	2	2.5	S. 11 E.	8	10	0	......	....
.752	.539	.698	.663	S	NE	NE	4	2	4	1.4	N. 87 E.	9	4	10	......	....
.703	.698	.712	.704	NE	NE	NE	4	2	2	2.7	N. 45 E.	10	10	10	......	....
.800	.753	.712	.755	NW	S	S	2	2	4	1.6	S. 17 W.	10	10	10	......	.94
.752	.628	.712	.697	S	S	W	12	12	25	11.7	S. 46 W.	10	10	10	......	.04
.794	.577	.756	.709	S	S	NE	4	2	2	1 6	S. 17 E.	8	10	5	......	.24
.843	.719	.712	.758	Calm	S	S	0	4	12	5.3	South	4	10	4	......	....
.696	.647	.693	.679	....	....	....	....	....	....	3.3	N. 27 W.	7.9	8.6	7.0	......	2.54

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.										VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1862.					°	°	°	°	°	°	°	°	°				
Dec. 1	29.690	29 677	29.742	29.679	33 5	31	32	36	34	35	35.0	37	32	.160	139	.142	.147
2	29.878	29.935	29.899	29 904	23	22.5	20.5	25	25.5	23	24.5	34	18	.100	.086	.081	.089
3	29.824	29.703	29.651	29.726	21	28	23	23.5	31.5	26	27.0	32	10	.084	.113	.089	.095
4	29.699	29.693	29.586	29.656	21.5	29	30	24	32	32.5	29.5	33	18	.086	.126	.138	.117
5	29.548	29.488	29.341	29.459	32	33	27	34	36	30	33.3	36	26	.155	.149	.113	.139
6	29.166	29.281	29.362	29.269	21.5	9	6	24	11.5	8	14.5	29	2	.086	.037	.034	.052
7	29.633	29.696	29.786	29.705	1 5	4.5	10	4	7	12	7.7	15	— 5	.018	.026	.046	.030
8	30.022	29.958	29.891	29.957	6	15.5	11.5	8.5	18	14	13.5	18	2	.029	.059	.044	.044
9	29.961	29.868	29.797	29.875	11	19.5	25	13	23	28	21.3	28	7	.049	.065	.100	.071
10	29.805	29.680	29.658	29.714	32.5	34.5	33	36	38	37	37.0	40	28	.139	.154	.136	.143
11	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
12	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
13	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
14	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
15	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....	....
16	....	29.291	29.320	29.305	....	35	32	...	39	36	37.5	39	32	...	.152	.129	.140
17	29.828	30.041	30.162	30.010	17	14.5	12	19	17	15	17.0	35	10	.071	.056	.041	.056
18	30.300	30.138	29.754	30.064	11	19	26	13.5	21.5	30	21.7	30	8	043	.075	.095	.071
19	29.680	29.961	30 170	29.937	36	16	7	39	19	9	22.3	39	7	.173	.056	.037	.089
20	30.407	30.448	30.394	30.416	–6.5	—1	—2	—5	1	0	—1.3	15	—14	.016	.019	.021	.019
21	30.375	30.198	30.001	30.191	7.5	16	16	10	19	20	16.3	20	— 7	.032	.056	.044	.044
22	29.916	29.779	29.701	29.799	18.5	27.5	32	21	29	36	28.7	36	15	.072	.133	.129	.111
23	29.856	29.966	30.037	29.953	29	26	19	31	29	22	27.3	34	12	.137	.106	.069	.104
24	30.132	30.002	29.839	29.991	12	21	28	13.5	23.5	31	22.7	32	7	058	.084	.119	.087
25	29.674	29.591	29.656	29.640	42	44	42	46	49	46	47.0	49	27	215	.225	.215	.218
26	29.680	29.420	29.275	29.458	36	37	35	38.5	39	38	38.5	44	35	.179	.194	.165	.179
27	29.440	29.495	29.520	29.485	32.5	33 5	33	35	37	36.5	36.2	37	32	.152	.146	.143	.147
28	29.602	29.572	29.530	29.568	32	37	34	35	40	37	37.3	40	30	.142	.181	.157	.160
29	29.500	29.554	29.615	29.556	37.5	40.5	33	41.5	44	37	40.8	44	33	.172	207	.136	.172
30	29.765	29.768	29.721	29.751	26.5	26	23.5	29	30	25	28.0	36	22	.115	.095	.109	.106
31	29.858	29.912	29.995	29.922	16	20.5	19	18	24	22	21.3	25	12	.067	.070	.069	.069
Means.....	29.807	29.773	29.746	29.769	21.8	24.6	23.4	23.7	27.6	26.4	26.3	....	....	.102	.108	.100	.103
1863.																	
Jan. 1	30.195	30.061	29.984	30.057	22	30	25	24	33.5	28	28.5	34	12	.095	.127	.100	.107
2	29.948	29 836	29.729	29.888	24	38	37.5	27	41	42	36.7	44	23	.095	.190	.166	.150
3	29.858	29.723	29.612	29.731	36	47	38	40	53	47	46.7	54	32	.160	.244	.112	.172
4	29.408	29.248	29.281	29.312	43	50	41	50	56	45	50.3	56	41	.186	.282	.205	.224
5	29.446	29.355	29.344	29.382	33	39	35.5	37	44	41	40.7	46	33	.136	.173	.136	.148
6	29.296	29.192	29.264	29.251	38	37	32	42.5	40.5	35	39.3	45	32	.170	.175	.142	.162
7	29.575	29.776	29.905	29.752	16	10	11	19	12.5	13	14.8	32	6	.056	.040	.049	.048
8	30.088	30.103	30.083	30.091	4	15	18	6	18	21.5	15.2	22	0	.030	.052	.059	.047
9	30.137	30.109	30.043	30.096	18	28.5	24	21	31	27	26.3	31	15	.065	.128	.095	.096
10	29.811	29.425	29.288	29.508	32	33	36	34	36	39	36.3	39	21	.155	.149	.173	.159
11	29.343	29.355	29.495	29.398	33	32	30	36	35	32	34.3	37	28	.149	.142	.144	.145
12	29.947	29.854	29.849	29.883	12	18	22.5	15.5	21	25	20.5	31	9	.035	.065	.091	.064
13	30.152	30.109	29.811	30.024	19	20.5	28	21	23	31	25.0	28	11	.080	.081	.119	.093
14	29.572	29.402	29.300	29.425	39	42	40	43	45	43	43.7	45	26	.186	.228	.208	.207
15	29.485	29 442	29.325	29.417	31.5	31	29	35	35	31	33.7	42	22	.137	.128	.137	.134
16	29.114	29.132	29.263	29.169	15	9	5.5	17	11	8	12.0	29	3	.063	043	.027	.044
17	29.959	30.196	30.329	30.161	–3.5	5	—7	–1.5	6	—5	–0.2	7	—14	.015	.043	.009	.022
18	30.503	30.480	30.400	30.461	–10	14	5	—8	16.5	7.5	5.3	17	—20	.005	.054	.026	.028
19	30.351	30.284	30.238	30.291	16	26	18	18	29.5	21	22.8	30	— 2	.067	.101	.065	.078
20	30.260	30.127	30.079	30.135	19	26	22	21	29.5	25.5	25.3	30	12	.080	.101	.078	.086
21	30.058	30.004	30.002	30.021	19	25	21	21	28.5	22	23.8	29	15	.080	.095	.101	.092
22	30.015	29.911	29.786	29.904	20	31.5	37	22.5	34.5	40	32.3	40	15	.079	.142	.181	.134
23	29.834	29.902	30.025	29.920	63.5	35 5	27	36	38.5	29	34.5	39	28	.160	.169	.124	.151
24	30.024	29.957	29 882	29.954	23	35	36	25	38.5	41	34.8	41	20	.100	.158	.147	.135
25	29.972	29.962	29.930	29.955	37	36	32.5	40	39	35	38.0	40	33	.181	.173	.152	.168
26	29.912	29.764	29.560	29.745	32	36	34	34.5	39	36	36.5	40	29	.149	.173	.170	.164
27	29.485	29.502	29.581	29.523	31.5	32	27	33	34	29	32.0	35	26	.160	.155	.124	.146
28	29.706	29.725	29.591	29.674	27	29	25	29	32	28	29.7	33	22	.124	.126	.100	.117
29	29.381	29.251	29.373	29.335	22	23	28	24.5	25.5	31	27.0	31	19	.089	.095	.119	.101
30	29.451	29.443	29.475	29.456	29	32	33	31.5	34	36	33.8	36	24	.131	.155	.149	.145
31	29.628	29.655	29.784	29.689	31	32.5	33	32	35	36	34.3	36	28	.162	.152	.149	.154
Means.....	29.802	29.751	29.729	29.759	24.3	29.2	26.8	27.0	32.1	29.8	29.5	....	....	.109	.133	.118	.120

of the north and northwestern lakes, at Sackett's Harbor, New York.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.753	.712	.698	.721	E by S	NE	N.	2	12	4	5.3	N. 41 E.	10	10	9	......	.18
.746	.628	.663	.679	N. NE	NE	SE	2	4	2	2.0	N. 57 E.	8	6	9	......	.06
.669	.639	.634	.647	NE	S	NE	4	2	4	2.2	N. 57 E.	10	9	5	......	....
.674	.694	.748	.705	NW	S	S	2	25	25	16.2	S. 2 W.	10	10	8	......	....
.792	.705	.675	.724	W	E. NE	SE	12	2	2	3.0	S. 86 W.	10	10	8	......	.04
.674	.505	.553	.577	NW	W	W	4	60	45	35.9	N. 89 W.	7	10	8	......	.06
.351	.423	.610	.461	NW	NW	NW	25	12	4	13.7	N. 45 W.	9	10	6	......	....
.472	.603	.545	.533	E	E	NE	4	2	2	2 5	N. 79 E.	8	10	1	......	....
.621	.532	.655	.603	E	E	S	2	2	4	1.9	S. 45 E.	10	10	10	......	....
.657	.673	.619	.649	W	SW	S	35	12	4	15.0	S. 74 W.	10	7	10	......	....
......	......	......	......	......	......	......	...	....	....	....	......	...	...	...	......	....
......	......	......	......	......	......	......	...	....	....	....	......	...	...	...	......	....
......	......	......	......	......	......	......	...	....	....	..	......	...	...	...	......	....
......	......	......	......	......	......	......	...	....	....	....	......	...	...	...	......	...
......	......	......	......	......	......	......	...	...	....	...	......	...	...	...	......	1.06
......	.636	.610	.623	......	W	N	...	35	45	28.5	N. 38 W.	...	8	9	....	....
.692	.589	.475	.585	N	N. NE	N	12	35	25	23.7	N. 11 E.	6	10	10	......	....
.538	.647	.569	.585	SE	S	S	2	25	45	23.7	S. 1 E.	10	10	7	......	....
.726	.541	.568	.612	SW	N. NE	NE	35	45	45	18.2	N. 27 E.	10	2	0	......	.06
.442	.416	.438	.432	N	N	Calm	4	2	0	2.0	North	0	0	0	......	....
.479	.511	.412	.477	S	S	E	2	2	2	1.5	S. 27 E.	8	9	10	......	....
.641	.831	.610	.694	Calm	S	W	0	12	2	4.0	S. 10 W.	10	10	10	......	....
.788	.665	.584	.679	NE	NE	NE	2	4	4	3.3	N. 45 E.	10	10	9	......	.02
.721	.669	.685	.692	NE	NE	Calm	12	2	0	4.7	N. 45 E.	4	6	10	......	....
.691	.638	.691	.673	S	S	S	35	35	2	24.0	South	10	6	9	......	....
.685	.816	.719	.740	NW	N. NE	NE	2	2	12	4.7	N. 34 E.	10	10	10	......	.02
.747	.665	661	.691	N	W	NW	4	25	12	12.0	N. 69 W.	10	10	10	......	.75
.698	.732	.712	.714	S	S	SW	2	4	4	3.0	S. 18 W.	10	8	6	......	.02
.657	.716	.619	.664	SW	SW	W	35	45	25	33.0	S. 55 W.	10	6	7	......	...
.720	.569	.809	.699	NE	NE	NE	25	25	35	28.3	N. 45 E.	10	9	0	......	....
.682	.547	.584	.604	NE	NE	NE	25	4	2	10.3	N. 45 E.	7	4	0	......	....
.652	.628	.621	.633	......	......	......	....	....	....	2.2	N. 72 W.	8.7	8.0	6.9	......	2.27
.738	.659	.655	.684	S	S. SW	S	4	4	2	3.2	S. 9 W.	8	10	0	......	....
.614	.738	.618	.667	S	S	SE	2	4	2	2.5	S. 11 E.	3	4	5	......	....
.645	.606	.344	.532	Calm	S	S	0	2	12	4.7	South	3	4	6	......	....
.515	.627	.684	.609	S	S	SW	25	35	60	17.3	S. 22 W.	3	10	8	......	....
.619	.597	.528	.581	S	SW	S	4	35	4	13.7	S. 37 W.	6	4	8	......	.02
.623	.692	.698	.671	SW	W	NW	25	4	35	15.3	N. 81 W	10	10	9	......	....
.741	.522	.623	.629	NW	NW	NW	60	45	25	13.3	N. 45 W.	10	9	7	......	.14
.520	.525	.509	.518	E	NE	NE	2	4	2	2.5	N. 56 E.	6	10	8	......	.02
.570	.736	.644	.650	S. SE	S	S	2	4	2	2.6	S. 6 E.	1	2	0	......	....
.792	.705	.726	.741	S	S	S	45	60	35	16.7	South	10	10	10	......	...
.705	.698	.794	.732	W	W	W	35	25	25	28.3	West	10	10	10	......	.34
.400	.570	.684	.551	NE	SE	SW	4	2	2	0.9	East	9	10	10	......	.04
.712	.663	.685	.687	NE	NE	SE	4	12	25	10.0	S. 78 E.	10	10	10	......	....
.669	.762	.750	.727	S	S	S	45	35	25	15.0	South	10	10	10	......	.22
.674	.628	.788	.697	NW	NE	NE	12	12	25	13 0	N. 27 E.	10	10	10	......	.52
.671	.596	.443	.570	NE	NE	NW	45	25	12	23.7	N. 35 E.	10	10	10	......	.08
.357	.760	.257	.458	NW	NE	Calm	4	2	0	1.5	N. 19 W.	8	0	0	......	.04
.156	.582	.434	.391	Calm	Calm	Calm	0	0	0	0.0	Calm	0	1	0	......	....
.682	.617	.570	.623	S	S	Calm	2	4	0	2.0	South	5	4	0	......	....
.712	.617	.568	.642	E. NE	NE	NE	2	25	4	10.3	N. 46 E.	10	6	9	......	....
.712	.605	860	.726	NE	NE	NE	12	4	2	6.0	N. 45 E.	10	10	2	......	....
.658	.716	.732	.702	NE	NE	S	2	2	12	3.2	S. 17 E.	10	10	10	......	....
.753	.722	.775	.750	W	W	NE	4	2	12	3.0	N. 17 E.	10	10	4	......	.22
.746	.677	.567	.663	E	S	S	12	2	35	13.0	S. 18 E.	7	10	7	......	.02
.732	.728	.747	.735	SW	SW	S	25	35	2	20 3	S. 44 W.	8	10	2	......	....
.744	.726	.802	.757	S	E	E	2	2	4	2.1	S. 71 E.	10	10	10	......	....
.850	.792	.775	.806	NE	NE	NE	35	35	4	24.7	N. 45 E.	10	10	6	......	.54
.775	.694	.655	.708	NE	Calm	NE	2	0	2	1.3	N. 45 E.	10	10	5	......	...
.680	.689	.685	.684	NE	N	W	25	4	2	9.0	N. 36 E.	10	10	9	......	....
.740	.792	.705	.745	S	S	SW	2	4	25	9.8	S. 38 W.	10	10	9	....	.01
.896	.747	.705	.782	W	SW	SW	12	60	25	31.3	S. 50 W.	10	8	9	....	.02
.659	.670	.645	.658	......	......	......	....	....	....	3.7	S. 34 W.	7.9	8.1	6.5	......	2.26

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
Feb. 1	29.759	29.447	29.210	29.472	31	34	37	32	40	41	37.7	41	29	.162	.118	.168	.149
2	29.568	29.651	29.779	29.666	24	19.5	13	26	22.5	16	21.5	40	1	.106	.071	.044	.074
3	29.856	29.948	30.031	29.945	3	12.5	—5	5	15	—3	5.7	16	—10	.027	.047	.012	.029
4	30.471	30.545	30.555	30.524	—24	—12	—10	—20	—11	—8	-13.0	—5	—30	....	.013	.005	.009
5	30.376	30.197	29.984	30.185	—4	12	12	—2	14	15	9.0	24	—18	.014	.052	.041	.036
6	29.517	29.449	29.609	29.525	23	23	24	25	26	26.5	25.8	27	8	.100	.089	.100	.096
7	29.895	29.943	29.891	29.909	20.5	29	27	24	32	31	29.0	32	19	.070	.126	.101	.099
8	30.064	30.072	30.071	30.069	22	32.5	28	25	37	31	31.0	37	20	.084	.126	.119	.113
9	30.149	29.979	29.521	29.883	17	15.5	31	19	19	33	23.7	33	15	.071	.048	.151	.090
10	29.675	29.838	29.996	29.836	32	25.5	22.5	36	29	25	30.0	36	22	.129	.098	.091	.106
11	30.092	29.995	29.801	29.963	9.5	26	20.5	12	29.5	23	21.5	30	8	.038	.101	.081	.073
12	29.727	29.636	29.691	29.685	21	23	18.5	23	26	21.5	23.5	26	17	.090	.089	.067	.082
13	29.996	30.089	30.173	30.086	3.5	12	5	6	15	7.5	9.5	20	0	.023	.041	.026	.030
14	30.238	30.063	29.696	29.999	—6	19	28	—4	23	32	17.0	32	—9	.010	.058	.108	.059
15	29.575	29.652	29.762	29.663	36	34	31	40	37	35	37.3	40	28	.160	.157	.128	.148
16	30.001	30.108	30.111	30.073	24.5	23	20.5	27	26	23	25.3	32	18	.103	.089	.081	.091
17	30.112	30.013	29.961	30.029	13	27	21	16	31	24.5	23.8	32	10	.044	.101	.073	.072
18	29.915	29.812	29.752	29.826	17	36	32.5	21	42	37	33.3	42	16	.049	.134	.126	.103
19	29.660	29.493	29.212	29.455	35	36.5	37	38	40	40	39.3	40	31	.165	.170	.181	.172
20	29.080	29.300	29.635	29.338	32.5	31	18	35	34	20.5	29.8	38	18	.152	.139	.070	.120
21	30.048	30.152	30.264	30.155	3.5	5.5	4.5	6	9	7	7.3	18	—1	.023	.016	.025	.021
22	30.247	30.095	30.043	30.129	—1	8	4	1.5	11	6.5	6.3	11	—6	.013	.028	.024	.022
23	30.197	30.154	30.101	30.151	-2.5	14	12	—1	18.5	14.5	10.7	22	—8	.022	.031	.046	.033
24	29.991	29.879	29.864	29.911	13.5	27.5	25.5	17	32.5	29	26.2	33	5	.041	.093	.098	.077
25	29.981	29.930	29.862	29.924	28.5	34	28	32	37.5	31	33.5	38	2	.116	.150	.119	.128
26	29.788	29.585	29.374	29.582	30.5	36	43	33	39	47	39.7	50	2	.141	.173	.225	.179
27	29.404	29.542	29.732	29.559	37	35	27.5	39.5	38.5	30	36.0	42	26	.188	.158	.121	.156
28	30.009	29.975	29.782	29.922	20.5	28	29	23	32	32	29.0	33	18	.081	.108	.126	.105
Means. ...	29.907	29.876	29.838	29.873	17.8	23.5	21.4	20.7	27.0	24.2	23.2	....	....	.082	.093	.091	.088
March 1	29.525	29.258	29.448	29.410	31.5	32	25	34	34.5	28	32.2	35	22	.148	.149	.100	.132
2	29.596	29.570	29.571	29.579	26.5	36	25	28.5	40	28	32.2	40	19	.120	.160	.100	.127
3	29.531	29.646	29.715	29.631	20	22	10	22.5	24	12	19.5	25	10	.079	.095	.046	.073
4	29.898	30.002	30.023	29.974	—1	10.5	—4	0	13	-1.5	3.8	18	—6	.030	.041	.008	.026
5	30.160	30.096	29.792	30.016	—24	16	20	—23	20	23	6.7	25	—34	....	.044	.074	.059
6	29.399	29.415	29.683	29.499	29.5	35	23	31	39	26	32.0	39	20	.146	.152	.089	.129
7	29.801	29.731	29.727	29.753	19	21	16	21.5	23.5	19	21.3	25	14	.075	.084	.056	.072
8	29.525	29.501	29.479	29.502	14	24	26	16.5	27	30	24.5	31	8	.054	.095	.095	.081
9	29.433	29.565	29.686	29.561	31	25.5	24	34	29	28	30.3	34	24	.139	.098	.083	.107
10	29.856	29.802	29.626	29.761	10	31	25	12.5	34	28	24.8	34	8	.040	.139	.100	.093
11	29.531	29.450	29.561	29.514	27	36	28	30	40	32	34.0	40	17	.113	.160	.108	.127
12	29.742	29.771	29.770	29.761	1	18	5	3.5	21	8	10.8	21	—4	.017	.065	.021	.034
13	29.862	29.800	29.715	29.792	11.5	15	10	—10	19.5	14	7.8	21	—18	.009	.035	.023	.022
14	29.682	29.539	29.645	29.622	12	24	9	15	28	12	18.3	28	4	.041	.083	.031	.052
15	29.876	29.856	29.794	29.839	-10.5	14	8	—9	19	11	7.0	19	—16	.010	.025	.028	.021
16	29.842	29.818	29.819	29.825	5	28	17	8	33	20	20.3	33	1	.021	.096	.060	.059
17	29.822	29.655	29.703	29.727	21.5	32.5	28	25	36.5	31	30.8	37	14	.075	.132	.119	.109
18	29.983	30.031	30.072	30.032	9	17	9.5	11	21	13	15.0	28	5	.043	.049	.027	.039
19	30.208	30.209	30.195	30.204	—8	21	8.5	—5	26	11	10.7	28	—13	....	.056	.035	.045
20	30.274	30.290	30.263	30.276	—10	19	11	-7.5	24	14	10.2	24	—15	...	.046	.037	.041
21	30.246	30.081	29.916	30.081	1	28	28.5	4	31.5	31	22.2	32	—2	.019	.113	.128	.084
22	29.895	29.876	29.852	29.874	34	40.5	31	37	45	34	38.7	45	27	.157	.194	.139	.163
23	29.938	29.785	29.753	29.825	24.5	25	28.5	27	29	30	28.7	31	23	.103	.089	.139	.110
24	29.695	29.604	29.507	29.602	30	40	42	33	45	46	41.3	46	31	.132	.182	.215	.176
25	29.354	29.161	29.334	29.283	45	53	35	48	57	39	48.0	57	36	.260	.350	.152	.254
26	29.427	29.439	29.552	29.473	33	35.5	32	36	39	34.5	36.5	40	31	.149	.162	.149	.153
27	29.770	29.841	29.810	29.807	27	32.5	25.5	30	37	29	32.0	37	24	.113	.126	.098	.112
28	29.715	29.522	29.368	29.535	25	36	33	28.5	41	37	35.5	41	23	.095	.147	.136	.126
29	29.383	29.435	29.691	29.509	24	26	27.5	27	28	31	28.7	36	18	.095	.117	.110	.107
30	29.953	29.964	29.865	29.927	18	30	22.5	21	33	25	26.3	33	15	.065	.132	.091	.096
31	29.633	29.410	29.330	29.458	24	36	32	28	40	34	34.0	40	14	.083	.160	.155	.133
Means....	29.760	29.714	29.718	29.730	15.4	27.7	21.3	18.0	31.5	24.4	24.6	..	...	.086	.115	.089	.095

of the north and northwestern lakes, at Sackett's Harbor, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1,000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.896	.476	.653	.675	S.......	S.....	S......	2	45	45	30.7	South....	0	9	10	......	....
.754	.591	.492	.612	W......	W. by N	NE....	60	35	25	26.7	N. 72 W.	8	9	6	......	.10
.500	.560	.317	.459	E. by N..	NE....	NE...	2	25	35	20.6	N. 47 E..	6	6	4	......	....
......	.519	.156	.357	NE......	NE	NE....	12	2	2	5.3	N. 45 E.	0	0	0	......	....
.345	.635	.475	.485	NE......	S......	S......	2	25	2	8.6	S. 3 E..	10	10	10	......	....
.746	.634	.699	.693	NE......	NE....	W.....	12	2	4	3.8	N. 31 E..	10	10	10	......	.36
.547	.694	.582	.608	E.......	S......	S......	2	4	35	13.3	S. 3 E..	9	4	6	......	.08
.622	.572	.685	.626	S........	S......	S......	2	2	2	2.0	South....	5	6	10	......	....
.692	.466	.800	.653	NE	NE....	S	25	35	45	14.5	S. 87 E..	10	10	10	......	....
.610	.611	.684	.635	W. by N.	W.....	W.....	35	45	12	30.5	N. 86 W.	10	8	6	......	.80
.513	.617	.663	.598	E.	Calm..	Calm..	2	0	0	0.7	East.....	5	3	4	......	....
.730	.634	.577	.647	E. by N..	NE ...	NE....	2	12	25	12.8	N. 47 E.	10	10	10	......	....
.400	.475	.434	.436	N........	NW...	Calm..	2	2	0	1.2	N. 23 W.	0	2	0	......	....
.284	.467	.594	.438	E.......	NE....	S......	2	2	60	19.7	S. 3 E..	5	3	8	......	....
.645	.702	.628	.662	S........	SW...	W.....	45	45	4	28.0	S. 25 W.	9	10	0	......	.08
.703	.634	.663	.667	NW......	NW...	NW...	25	12	2	13.0	N. 45 W.	9	2	2	......	....
.492	.582	.554	.543	N.	N. NE.	Calm..	2	2	0	1.3	N. 12 E..	10	0	0	......	....
.431	.500	.572	.501	Calm....	S.	Calm..	0	2	0	0.7	South ...	4	3	0	......	...
.719	.688	.732	.713	NE.	Calm..	E. ...	2	0	2	1.2	N. 67 E..	10	10	10	......	.12
.747	.712	.635	.698	W.......	NW...	NW...	4	25	45	24.3	N. 47 W.	10	9	10	......	1.28
.400	.250	.423	.358	N. NW..	N.	NE....	25	4	4	10.5	N. 13 W.	0	0	0	......	.08
.286	.398	.412	.365	NE.	NE ...	NE ..	25	25	12	20.7	N. 45 E..	10	10	7	......	....
.526	.307	.553	.462	NE.	NE....	Calm..	2	2	0	1.3	N. 45 E..	0	0	0	......	....
.429	.503	.611	.514	S........	S......	SW....	4	12	2	5.8	S. 5 W.	9	8	7	......	....
.644	.669	.685	.666	SW. ...	SW....	SW...	2	12	2	5.3	S. 45 W.	10	4	3	......	....
.752	.726	.698	725	E.	Calm..	S......	2	0	35	11.7	S. 4 E..	10	10	10	......	....
.773	.677	.729	.726	SW.....	SW...	NW...	25	45	35	26.2	S. 72 W.	10	10	10	....	.18
.663	.594	.694	.650	Calm...	W.....	NE....	0	2	2	0.5	N. 22 W.	4	2	8	......	....
.587	.568	.585	.577	....	....	....	....	....	....	2.5	S. 61 W.	6.9	6.0	5.5	......	3.08
.760	.744	.655	.719	SE	NE ...	NE...	12	25	2	9.8	N. 69 E..	10	10	10	......	....
.771	.645	.655	.690	Calm	N......	NE....	0	2	12	4.5	N. 39 E..	10	10	8	......	.40
.658	.738	.610	.669	NE......	NE....	NE ...	35	35	4	24.7	N. 45 E..	10	8	4	......	.16
.695	.530	.198	.474	NE......	N.	Calm..	25	4	0	9.3	N. 39 E..	8	3	0	......	.06
......	.412	.598	.505	E.	SW...	S......	2	2	45	15.5	South....	0	2	9	......	....
.841	.636	.634	.704	S........	SW....	SW....	60	45	4	33.7	S. 20 W.	6	8	2	......	..
.647	.669	.541	.619	NE......	NE....	NE....	12	35	25	24.0	N. 45 E..	9	10	10	......	.01
.582	.644	.569	.598	NE......	NE ...	S......	35	2	2	11.8	N. 48 E..	10	8	10	......	.06
.712	.611	.543	.622	SW.	SW...	NW....	4	75	4	26.3	S. 48 W.	10	7	4	......	.15
.522	.712	.655	.629	Calm....	S......	S......	0	2	4	2.0	South...	2	7	1	......	....
.675	.645	.594	.638	S........	S......	NE ...	4	25	12	7.5	S. 22 E..	4	9	10	......	....
.339	.570	.344	.414	N. NE...	N.	N......	2	2	2	1.9	N. 8 E.	4	5	5	......	.04
.310	.329	.280	.306	Calm.....	NE....	SW...	0	2	12	3.3	S. 45 W.	6	3	0	......	....
.475	.543	.418	.479	NW.....	W......	NE....	25	45	25	19.2	N. 52 W.	5	10	0	......	....
.329	.245	.398	.324	Calm....	NE....	NE ...	0	4	2	2.0	N. 45 E..	0	5	0	......	.02
.334	.510	.556	.467	NE......	W.....	Calm..	2	2	0	0.5	N. 22 W.	9	1	0	......	....
.561	.614	.685	.620	S.	S.	Calm..	4	12	0	5.3	South ..	9	10	0	......	....
.596	.431	.346	.458	NE	NE....	Calm..	12	4	0	5.3	N. 45 E..	0	0	0	......	....
......	.397	.496	.446	Calm....	Calm..	Calm..	0	0	0	0.0	Calm....	0	0	0	......	....
......	.358	.457	.407	Calm ...	NE....	Calm..	0	25	0	8.3	N. 45 E..	0	8	0	......	....
.223	.639	.736	.533	E........	S	S......	2	4	35	13.3	S. 3 E..	5	10	10	......	....
.712	.645	.712	.699	S........	SW...	Calm..	2	2	0	1.2	S. 23 W.	10	8	4	......	.06
.703	.556	.836	.698	NE......	NE....	NE ...	4	12	2	6.0	N. 45 E.	8	5	8	......	....
.703	.607	.691	.665	SE.	S......	S......	60	60	75	60.7	S. 14 E..	9	10	10	......	....
.777	.752	.636	.722	S.	S	S......	2	45	12	19.7	South....	10	8	10	......	.44
.705	.681	.744	.710	SW.....	SW...	W.....	2	25	45	22.0	S. 73 W.	10	10	10	......	.22
.675	.572	.611	.619	N.......	SW...	Calm..	2	4	0	1.0	S. 74 W..	10	10	2	......	.14
.605	.587	.619	.597	SE	SE. ...	Calm..	2	12	0	4.7	S. 45 E.	0	10	10	......	.
.644	.768	.633	.682	SW.	W.....	SW...	60	45	35	43.7	S. 59 W.	10	10	9	......	.12
.570	.703	.684	.652	Calm....	SW...	Calm..	0	4	0	1.3	S. 45 W.	1	1	0	......	.16
.543	.645	.792	.660	SE	S.....	Calm..	2	4	0	1.8	S. 15 E..	5	10	8	......	....
.574	.584	.578	.581	....	....	....	....	....	....	4.0	S. 5 W	6.1	6.9	4.9	....	2.07

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT. Wet bulb, or point of evaporation.			TEMPERATURE—FAHRENHEIT. Dry bulb, or temperature of the open air.				Maximum.	Minimum.	VAPOR. Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
April *1	29.831	29.565	29.491	29.439	10.5	17.5	21	13	21	24	19.3	31	7	.042	.056	.079	.059
*2	28.823	28.850	29.243	28.972	32.5	37	32.5	37	41	35	37.7	41	19	.127	.168	.154	.150
†3	29.588	29.795	29.925	29.769	23	28	25	27	32	28	29.0	34	23	.078	.108	.100	.095
4	30.118	30.060	29.911	30.030	23	30.5	27	24	34	31	29.7	34	16	.062	.131	.101	.098
5	29.639	29.528	29.455	29.541	25.5	31	32	29	34	35	32.7	35	24	.098	.139	.142	.126
†6	29.420	29.487	29.528	29.478	34	38	33	37	42	36	38.3	43	31	.136	.177	.149	.154
†7	29.635	29.763	29.863	29.754	27	28.5	24	30	31	26	29.0	34	22	.113	.128	.106	.116
*8	29.956	29.955	29.918	29.943	23	27	25	25	31	27	27.8	31	20	.095	.101	.112	.103
*9	29.853	29.909	29.920	29.894	24	39	34	27	44	37	36.0	44	20	.095	.173	.157	.142
10	29.910	29.726	29.613	29.750	30	42	47	32	48	52	44.0	52	28	.144	.189	.257	.197
‡11	29.542	29.494	29.410	29.480	46	55	53	53	63	60	58.7	63	40	.219	.327	.310	.285
12	29.518	29.663	29.752	29.644	45	35	33	50	39	37	42.0	61	34	.234	.152	.136	.174
13	29.914	29.909	29.887	29.903	27.5	36	31	31	42	35	36.0	42	27	.110	.134	.128	.124
14	29.954	29.942	29.862	29.919	30	36	35	33	42	39	38.0	49	27	.132	.134	.162	.143
15	29.850	29.830	29.793	29.823	32	48	45	35	58	53	48.7	58	31	.142	.203	.194	.180
16	29.886	29.749	29.692	29.749	39	41	39	42	44	42	42.8	52	38	.192	.218	.199	.203
17	29.677	29.692	29.704	29.691	37.5	40	40	41	43	43	42.3	43	37	.179	.208	.208	.198
18	29.781	29.776	29.755	29.772	41	46	38	43	49.5	41	44.5	50	38	.231	.265	.190	.229
19	29.812	29.760	29.740	29.771	37.5	49	47	40	54	51	48.3	55	36	.193	.282	.270	.248
20	29.860	29.922	29.956	29.913	40	43	41	44	48	44	45.3	50	40	.195	.212	.218	.208
21	30.116	30.102	30.042	30.087	42	48	45	45	52	48	48.3	53	40	.228	.282	.260	.257
22	30.012	29.922	29.834	29.923	37	50.5	44	39	56	50	48.3	58	35	.194	.295	.209	.233
23	29.808	29.674	29.577	29.686	38	52.5	50	41	62	55	52.7	62	37	.190	.271	.295	.252
24	29.530	29.422	29.436	29.463	42.5	48	42	47.5	55	47	49.8	60	43	.207	.243	.202	.217
25	29.559	29.594	29.616	29.590	34	38	38	37	47	46	43.3	49	33	.157	.112	.125	.131
26	29.789	29.728	29.693	29.738	34	43	39	38	52	42	44.0	53	34	.144	.160	.199	.168
27	29.794	29.738	29.646	29.726	34	48	44	40	55	50	48.3	55	35	.160	.243	.209	.204
28	29.620	29.560	29.565	29.582	43	52	45	48	61	53	54.0	62	42	.212	.289	.194	.227
29	29.583	29.517	29.518	29.533	39	49	47	43	57	52	50.8	57	39	.186	.242	.250	.226
30	29.683	29.667	29.655	29.668	43	50	43	47.5	58	50	51.8	59	39	.219	.255	.186	.220
Means.....	29.715	29.710	29.698	29.708	33.7	40.9	37.9	37.0	46.5	42.3	42.0	....	....	.157	.196	.183	.178
May 1	29.735	29.647	29.602	29.661	41	52	49	46	63	58	55.7	64	37	.192	.243	.229	.221
2	29.650	29.708	29.708	29.689	43	43	39	49.5	51	46	48.8	57	42	.192	.173	.147	.171
3	29.818	29.775	29.708	29.767	34	46	43	38	55	48	47.0	56	32	.144	.192	.212	.183
4	29.659	29.634	29.614	29.636	40	42	43	44	46	47	45.7	48	31	.195	.335	.225	.252
5	29.728	29.708	29.686	29.707	35	41	42	41	49	48	46.0	49	37	.147	.153	.189	.163
6	29.756	29.785	29.726	29.756	41	45	44	46	51	49.5	48.8	51	42	.192	.220	.216	.208
7	29.714	29.668	29.583	29.655	41	47	44	46	53	50	49.7	54	42	.193	.244	.209	.215
8	29.093	29.650	29.635	29.659	37.5	49	45	41	54	50	48.3	57	35	.180	.282	.231	.232
9	29.688	29.672	29.640	29.667	42	52	50	47	61	57	55.0	61	38	.202	.269	.268	.246
10	29.724	29.670	29.644	29.679	49	58	56	53	67	62	60.7	67	48	.295	.263	.369	.312
11	29.680	29.742	29.732	29.718	53.5	51	49.5	57.5	55	53	55.2	60	50	.358	.321	.309	.329
12	29.718	29.727	29.702	29.716	48	52	49	51.5	55.5	52	53.0	56	48	.289	.342	.308	.313
13	29.760	29.707	29.653	29.707	47	52	47.5	50	57	52	53.0	57	45	.283	.322	.270	.292
14	29.628	29.558	29.551	29.579	46	49	48	49	52.5	51	50.8	53	43	.271	.302	.296	.284
15	29.643	29.677	29.638	29.653	43.5	48	44	48	55	48	50.3	55	43	.230	.242	.236	.236
16	29.583	29.472	29.460	29.505	46	53	54	53	60	58	57.0	61	42	.219	.310	.379	.303
17	29.535	29.580	29.543	29.553	48	47	45	54.5	54	49	52.5	57	46	.249	.230	.247	.242
18	29.585	29.548	29.663	29.599	43	45	44	46	50	48	48.0	50	40	.238	.271	.236	.235
19	29.758	29.742	29.710	29.737	43	53	50	46	59	51	53.0	60	41	.238	.223	.308	.290
20	29.747	29.740	29.714	29.734	51	56	52	57.5	62	58	59.2	63	49	.288	.369	.309	.322
21	29.850	29.897	29.848	29.865	54	59	55	61	69	62	64.0	69	54	.325	.357	.340	.344
22	29.948	29.834	29.830	29.871	43	61	58	58	71	67	65.3	72	52	.081	.403	.363	.282
23	29.805	29.711	29.644	29.720	53	62	55	58	69.5	61.5	63.0	70	53	.338	.456	.317	.379
24	25.596	29.558	29.551	29.568	54	61	57	59	70	65	64.7	70	55	.351	.416	.359	.375
25	29.711	29.756	29.759	29.739	53	54	50	58	61	56.5	58.5	64	53	.338	.325	.275	.313
26	29.810	29.761	29.762	29.778	49	59	55	53	70	61	61.3	71	45	.295	.351	.354	.334
27	29.883	29.826	29.800	29.836	51	62	50	55	70	61	62.0	71	49	.321	.435	.216	.324
28	29.845	29.774	29.680	29.766	52	61	47	57	70	65	64.3	70	47	.324	.416	.086	.275
29	29.680	29.546	29.471	29.566	58	63	62	65	72	70	69.0	74	57	.389	.455	.449	.431
30	29.421	29.265	29.216	29.300	64	68	61	72	75	68	71.7	80	65	.489	.591	.543	.541
31	29.153	29.095	29.080	29.109	65	63	61	70	69	65	68.0	72	61	.550	.495	.483	.509
Means....	29.693	29.650	29.629	29.651	47.4	53.4	50.1	52.6	60.5	56.1	56.4	....	....	.273	.328	.291	.298

* Snow. † Rain and snow. ‡ Rain.

of the north and northwestern lakes, at Sackett's Harbor, New York.

VAPOR.				WIND.								Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.					
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.			7 a. m.	2 p. m.	9 p. m.		
.530	.501	.610	.537	NW.	W.....	S.	12	12	25	8.8	S. 52 W..	9	7	10	......	.10
.573	.653	.747	.658	S.........	W.....	NW...	60	60	4	21.0	S. 87 W.	10	8	10	......	.06
.529	.594	.655	.593	N.........	N.	Calm..	12	12	0	8.0	North....	2	3	0	......	.12
.483	.664	.582	.576	NE......	NE....	NE ...	2	25	4	10.3	N. 45 E..	0	0	0	......	...
.611	.712	.698	.674	NE.	NE....	SW....	35	12	2	15.0	N. 45 E..	10	10	10	......	...
.619	.661	.705	.662	Calm....	W.....	NE....	0	2	4	1.0	N. 16 E..	10	10	10	......	.92
.675	.737	.754	.722	NE......	NE....	NE....	35	45	45	41.7	N. 45 E.	10	10	10	......	.16
.698	.542	.761	.680	NE......	NE ...	SW....	12	2	4	3.3	N. 45 E.	10	10	10	......	.12
.644	.597	.712	.651	SW. ...	SW....	S.	4	4	2	2.0	S. 70 W.	5	0	0	......	.22
.794	.563	.660	.672	S	S......	S.	2	4	35	13.7	South. ..	6	10	10	......	...
.544	.568	.599	.570	S.	S	S	45	35	45	41.7	South....	10	6	4	......	.04
.646	.633	.619	.634	S.SW ...	N.NE..	N......	25	12	12	1.7	West....	10	10	5	......	.04
.634	.500	.628	.587	NE.	N	Calm..	12	2	0	4.5	N. 39 E.	0	0	0	......	...
.703	.500	.616	.613	Calm....	W.. ..	Calm .	0	2	0	1.3	West. ..	0	0	0	......	...
.693	.421	.483	.531	E.	E......	S	2	4	12	4.6	S. 27 E..	8	10	6	......	...
.706	.756	.744	.735	NE.	NE ...	NE....	2	25	25	17.3	N. 45 E..	10	10	10	......	.32
.696	.750	.750	.732	NE.	NE....	NE....	4	2	2	2.7	N. 45 E.	10	10	10	......	1.06
.833	.748	.738	.773	Calm....	W.....	Calm..	0	2	0	0.7	West....	10	8	0	......	.08
.776	.674	.724	.724	NW. ..	NE....	Calm..	2	4	0	1.2	N. 18 E..	10	4	0	......	...
.677	.631	.756	.721	NE.	NE ...	NE ...	25	45	12	27.3	N. 45 E..	7	9	10	......	...
.762	.727	.777	.755	E.	NW. ..	Calm..	2	4	0	1.0	N. 16 W.	10	1	1	......	.08
.815	.657	.581	.685	E.	W.....	Calm..	4	2	0	0.7	East.....	3	2	0	......	...
.738	.486	.681	.635	E........	W......	Calm..	2	12	0	3.3	West....	3	3	5	......	...
.628	.561	.624	.604	Calm....	W.....	N.NE..	0	4	60	19.7	N. 19 E..	4	5	6	......	...
.712	.334	.400	.482	N.NE...	N.. ...	N.	35	45	25	34.3	N. 7 E..	8	3	0	......	...
.628	.411	.744	.594	N.........	N.NW.	S	12	25	2	11.6	N. 16 W.	0	0	0	......	...
.645	.561	.581	.596	S.........	SW...	SW...	4	12	4	6.3	S. 37 W.	0	0	0	......	...
.641	.502	.483	.539	S.........	W.....	NE ...	2	2	35	10.8	N. 45 E.	3	5	2	......	...
.669	.581	.633	.628	NE.	NE....	E......	25	12	2	12.8	N. 48 E..	6	4	5	......	...
.663	.539	.515	.569	NE.	NE ...	W....	12	25	2	12.0	N. 43 E..	2	0	0	......	...
.665	.593	.652	.637	....	....	... .	....	....	....	4.7	N. 35 E..	6.2	5.3	4.5	......	3.34
.617	.422	.475	.505	SW.....	SW. ..	S	4	4	2	3.2	S. 36 W.	0	0	0	......	...
.543	.461	.471	.492	NE.	NE....	NE....	25	25	35	28.3	N. 45 E..	0	5	0	......	...
.628	.445	.431	.568	NE.	NE....	NE....	25	4	25	18.0	N. 45 E.	0	5	9	......	...
.677	.747	.693	.707	NE.	NE ..	NE ...	35	35	4	24.7	N. 45 E.	10	10	3	......	.18
.567	.439	.564	.523	NE.	NE ...	NE....	45	45	35	41.7	N. 45 E.	4	10	10	......	.12
.617	.590	.611	.606	E	SE. ...	E.	4	12	2	5.6	S. 60 E.	10	10	10	......	...
.617	.606	.581	.601	NE.	NE ..	Calm..	12	25	0	12.3	N. 45 E.	10	8	0	......	...
.696	.674	.646	.672	NE.	W.....	S......	4	12	2	3.1	N. 85 W.	0	0	0	......	...
.624	.502	.577	.568	S..	SW.. ..	Calm..	2	4	0	1.8	S. 30 W	0	0	0	......	...
.733	.551	.665	.649	SW... .	SW. ..	SW....	2	4	2	2.7	S. 45 W	3	6	10	......	.06
.754	.743	.796	.761	W. by N.	NE ...	NE ...	2	12	25	8.7	S. 71 E	10	10	10	......	.30
.758	.776	.794	.776	NE. ...	SW....	Calm..	25	2	0	7.7	N. 45 E.	10	10	10	......	.25
.786	.692	.693	.724	S.SW...	SW...	SW...	4	25	2	10.0	S. 42 W.	10	5	7	......	...
.781	.763	.790	.778	SE......	NE....	N......	2	35	12	14.7	N. 37 E..	9	10	10	......	.74
.791	.561	.704	.655	N. by W.	SW. .	SW....	12	35	2	10.7	S. 63 W.	6	5	0	......	...
.544	.599	.786	.643	SE......	S......	S	25	12	2	12.0	S. 29 E.	10	10	10	......	...
.587	.552	.710	.616	SW......	SW....	SW. ..	25	35	12	24.0	S. 45 W	8	9	1	......	.14
.767	.575	.704	.682	S	S........	SW. ..	2	12	25	12.0	S. 29 W	10	10	5	......	...
.767	.647	.738	.717	S. by W	SW....	S......	12	25	4	12.9	S. 32 W.	0	5	7	......	.18
.609	.665	.641	.638	S..........	S. by W	S......	25	12	12	16.2	S. 3 W	9	4	8	......	....
.606	.518	.612	.579	SW.	S. by W	S	25	25	4	17.7	S. 42 W.	0	0	0	......	....
.166	.532	.550	.416	S	S... ...	S	12	4	2	6.0	South....	0	4	0	......	....
.698	.634	.635	.655	S	SW....	S	2	2	2	1.8	S. 15 W	0	0	0	......	....
.703	.570	.582	.618	SW......	NE....	NE....	2	12	25	11.7	N. 45 E..	0	2	6	......	....
.693	.606	.612	.635	SE.	SE. . .	E......	2	4	2	2.5	S. 56 E.	10	8	0	......	....
.733	.482	.659	.625	NE......	Calm. .	Calm. .	4	0	0	1.3	N. 45 E.	0	0	0	......	.04
.743	.576	.402	.574	Calm ...	W. ...	Calm. .	0	2	0	0.7	West. ...	0	0	0	......	...
.692	.570	.138	.467	SW.	SW. ..	SW....	2	4	2	2.7	S. 45 W.	0	0	0	......	....
.631	.582	.613	.609	SW.	Calm..	S	4	0	2	1.8	S. 39 W..	0	4	6	......	....
.624	.681	.793	.699	S	SW....	S......	12	4	2	5.8	S. 9 W.	5	9	4	......	....
.751	.700	.783	.745	SW.....	SW. ..	SW. ..	12	4	4	6.7	S. 45 W.	6	9	7	......	....
.658	.595	.633	.629	... .	....	....	....	....	....	1.8	S. 79 E..	4.2	5.4	4.3	......	2.02

O.—*Reductions of the monthly meteorological register of the survey*

Date.	Barometer reduced to temperature of 32° Fahrenheit, expressed in United States inches and decimals.				TEMPERATURE—FAHRENHEIT.									VAPOR.			
					Wet bulb, or point of evaporation.			Dry bulb, or temperature of the open air.				Maximum.	Minimum.	Elasticity, U. S. inches and decimals.			
	7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.	Mean.			7 a. m.	2 p. m.	9 p. m.	Mean.
1863.					°	°	°	°	°	°	°	°	°				
June 1	29.106	29 131	29.175	29.137	58	59	49	62	63	53	59.3	64	50	.429	.447	.295	.390
2	29.253	29.322	29.400	29.325	49	51	51	52	55	54	53.7	55	48	.308	.321	.335	.321
3	29.550	29.597	29 560	29.569	47	51	48	51	58	54	54.3	58	47	.270	.292	256	269
4	29.682	29.672	29 640	29 665	47	54	49	51.5	61	57	56.5	61	45	264	.325	242	277
5	29.632	....	29 606	29.619	53		55	60	...	62	61.0	69	50	.310	..	.340	.325
6	29 740	29.785	29.757	29.761	50	55	51	51	61	56	57.0	61	50	.308	.354	.308	.322
7	29.814	29.776	29.705	29.765	48	42	49	52.5	58	53	54.5	58	48	.276	.189	.295	.253
8	29.726	29.654	29.592	29.661	50	56	52	53	60	57	56.7	60	49	.324	.396	.322	.346
9	29.535	29.533	29 514	29.527	54	57	54	56	70	61	62.3	71	49	.391	.293	.325	.336
10	29.638	29.614	29.554	29.602	54	60	57	59	68	65	64.0	70	50	.351	.411	359	.374
11	29.614	29.581	29.533	29 576	56	61	62	61.5	70	70	67.2	71	65	.376	.416	.449	.414
12	29.618	29.641	29.618	29.626	60	64	62	66	70	68	68.0	70	58	.438	.516	.476	477
13	29.742	29.733	29.726	29 734	59	67	61	64	75	67	63.7	75	60	.433	.554	.457	.481
14	29.781	29.749	29.636	29.722	62	60	61	68	69	68	68.3	70	60	.476	.39	.443	439
15	29.543	29.543	29.564	29.550	58	62	53	61.5	74	64	67.2	74	59	395	396	270	.354
16	29.813	29.800	29.672	29.762	48	51	46	52	61	53	55.5	61	48	.189	.242	.219	.217
17	29.530	29.409	29.352	29.430	44.5	57	55	55	64	61	60.0	65	47	.243	.373	.354	.323
18	29.414	29.438	29 414	29.422	52	60	58	58	68	65	63.7	69	51	.309	.411	.389	.365
19	29.452	29.481	29.473	29.469	56	65	63	61	74	70	68.3	74	55	.383	.497	.482	.454
20	29.660	29.628	29.564	29.617	53	58	59	61	68	63	64.0	69	58	.297	.330	.447	.355
21	29.648	29.641	29.576	29.622	54	60	57	60	65	61	62.0	66	56	.338	.451	.412	.400
22	29.602	29.576	29.539	29.572	54	59	55	58.5	67	60	61.8	67	54	.348	393	.357	.372
23	29.629	29.676	29.714	29 673	55	56	54	59	62	59	60.0	62	54	.380	.369	.351	.367
24	29.853	29.858	29.836	29.849	54	59	55	58	66.5	60	61.5	67	51	.365	400	.367	.377
25	29.902	29 841	29.791	29.845	54	64	60.5	57	70	67	64.7	71	49	.378	.516	.440	.445
26	29.866	29.833	29.785	29.818	60	67	65	67	76	72	71.7	78	50	.425	.542	.524	.49
27	29.911	29.850	29.795	29.852	61	68	65	65.5	76.5	72	71.3	80	60	.477	.571	.524	.524
28	29.813	29.772	29.690	29 758	64	70	65	70.5	82	75.5	76.0	82	62	.509	.57	.477	.519
29	29.745	29 682	29.653	29.693	63.5	71	67	72	83	77	77.3	84	63	.472	.597	.527	.532
30	26.663	29.648	29.570	29.627	65	72	69	74	84	78	78.7	84	69	.497	.623	.588	.569
Means.....	29.649	29.637	29.600	29.628	54.8	59.9	56.9	60.1	68.2	63.3	63.8	....	..	.365	.420	.388	.390

of the north and northwestern lakes, at Sackett's Harbor, New York.

VAPOR.				WIND.									Amount of cloudiness. (0 = clear sky.) (10 = sky entirely overcast.)			Amount of evaporation, U. S. inches and decimals.	Am't of rain or melted snow, U. S. inches and decimals.
Humidity. Saturation = 1.000.				Direction—from whence.			Velocity, in miles per hour.			Resultant velocity, in miles per hour.	Resultant direction.						
7 a. m.	2 p. m.	9 p. m.	Mean.	7 a. m.	2 p. m.	9 p. m.	7 a. m.	2 p. m.	9 p. m.				7 a. m.	2 p. m.	9 p. m.		
.772	.776	.733	.760	SW.	SW.	SW.	25	45	35	35.0	S. 45 W.		10	10	7	......	.08
.794	.743	.802	.780	W.	SW.	SW.	45	35	12	28.3	S. 67 W.		10	9	10	......	.14
.722	.584	.613	.640	N.	SW.	SW.	12	25	4	7.5	S. 68 W		6	3	5	....	.30
.689	.606	.521	.605	SW.	SW.	S.	4	12	4	6.3	S. 37 W.		4	2	2	......	....
.599	..	.612	.606	S.	....	NE.	25	..	25	9.5	S. 67 E.		8	..	9	......	....
.738	.659	.687	.695	NE.	SW.	SW.	12	25	4	5.7	S. 45 W.		10	5	4	......	.34
.696	.563	.733	.664	NE.	W.	NE.	4	4	12	4.5	N. 33 E.		8	9	10	......	..
.798	.765	.692	.752	N.	S.	SW.	4	25	4	8.0	S. 7 W.		8	10	8	......	.24
.872	.400	.606	.626	SW.	NE.	Calm	2	35	0	11.0	N. 45 E.		1	8	0	......	.40
.703	.601	.582	.629	S by W.	SW.	S.	12	12	4	8.9	S. 24 W.		2	0	3	.....	....
.689	.570	.613	.624	Calm	W.	Calm	0	2	0	0.7	West		4	10	10	......	....
.685	.704	.695	.695	Calm	NE.	NE.	0	12	4	5.3	N. 45 E.		9	10	10	......	...
.727	.693	.690	.703	NE.	SW.	Calm	2	12	0	3.3	S. 45 W.		8	4	0	.....	.02
.695	.564	.647	.635	S.	S.	S.	25	12	4	13.7	South		6	10	3	......	....
.653	.472	.470	.532	SW.	NE.	NE.	35	35	12	4.0	N. 45 E.		8	6	0	......	....
.478	.452	.544	.491	NE.	SW.	S.	25	35	2	3.8	S. 38 W		2	3	2	......	....
.561	.625	.659	.615	S.	N.	Calm	2	2	0	0.0	....		10	6	0	......	....
.641	.601	.631	.624	S.	S.	Calm	12	12	0	8.0	South		9	8	5	......	....
.713	.593	.658	.655	NE.	S.	S.	12	35	25	17.3	S. 9 E.		7	10	10	......	....
.553	.511	.776	.613	S.	S.	E.	25	25	4	16.7	S. 5 E.		10	10	10	...	.18
.653	.731	.769	.718	S.	S.	S.	25	4	2	10.3	South		10	8	10	......	16
.729	.595	.708	.677	S. SW.	SW.	SW.	12	12	4	9.2	S. 34 W.		10	7	8	......	.06
.761	.665	.703	.710	SW.	SW.	W.	25	35	2	20.3	S. 46 W.		5	10	10	......	....
.756	.615	.708	.693	S.	SW.	S.	2	12	2	5.0	S. 34 W.		8	4	0	......	.42
.812	.704	.606	.727	Calm	SW.	S.	0	4	2	1.8	S. 30 W.		0	3	0	......	...
.642	.603	.668	.638	SE.	W.	S.	2	4	2	1.4	S. 37 W.		0	2	0	......	....
.759	.626	.668	.684	Calm	W.	Calm	0	12	0	4.0	West		0	0	0	.....	....
.683	.524	.541	.583	S.	SW.	E.	4	12	2	4.7	S. 28 W		3	4	0	......	....
.602	.529	.569	.567	S.	S.	S.	12	45	25	27.3	South		0	4	2	......	....
.593	.535	.613	.580	S.	S.	S.	45	35	4	28.0	South		8	7	0	......	....
.692	.607	.652	.650	....	....	....	....	....	...	7.4	S. 21 W.		6.1	6.2	4.6	.....	2.34

APPENDIX.

APPENDIX.

EXPEDITION OF BRIGADIER GENERAL SULLY AGAINST THE NORTHWEST INDIANS.

HEADQUARTERS NEW MEXICO EXPEDITION,
Camp at Mouth of Little Cheyenne River, September 11, 1863.

MAJOR: The last report I had the honor to send you was from the mouth of the Little Cheyenne river, bearing date August 16, 1863; since which time my movements have been too rapid, and the danger of sending any communication such that it has been impossible for me to do so. I therefore have the honor to report my movements from last report up to date.

On the morning of the 19th the steamer I was waiting for, with supplies, finally arrived. She was immediately unloaded, and all the baggage of the officers and men of the command was sent down by her to the depot at Fort Pierre, together with every man who was in the least sick or not well mounted. By this I reduced my force considerably, and was enabled to transport, with the wretched mules that had been furnished me, about twenty-three days' rations, and forage enough to keep these transportation animals alive, depending on grass I might find to feed the cavalry and artillery horses. Luckily for me, I found the grazing north in much better condition than I had dared to hope for.

On the 20th we were visited by one of the most terrific rain and hail storms I have seen. This stampeded some of my animals, and a few were lost—they swam across the Missouri—and it also destroyed a quantity of my rations in the wagons, thereby causing me some delay in the march; but I succeeded in getting off on the afternoon of the 21st, and marched up the Little Cheyenne about eleven miles, the road being very heavy. The next day we marched only seven miles, camping at a slough on the prairie without wood. The next, we marched in a northwesterly direction to the outlet of Swan lake. On the 24th we marched due north eighteen miles, and encamped on a small creek called Bois Cache. Here we came into the buffalo country, and I formed a hunting party for the command, which I had soon to disband, as they disabled more horses than buffaloes. We continued our march north about twenty-two miles, and reached a small stream called Bird Ache creek. This day the hunters succeeded in killing many buffaloes, and reported that they saw Indians near the Missouri.

Early on the morning of the 26th I sent out a small scouting party who captured two squaws and some children and brought them in to me. These Indians reported that General Sibley had had a fight near the head of Long lake, and that they were on their way to the agency at Crow Creek, but were lost, and were alone; but the scouts found tracks of lodges going up the Missouri. I therefore immediately detailed companies F and K, of the 2d Nebraska cavalry, under command of Captain La Boo, ordering them to go to the Missouri and follow up the trail, with orders to capture some Indians if possible, and bring them in, so that I might get information; if they could not do that, to kill them and destroy their camps. I continued the march with the rest of the command that day, passing through large herds of buffaloes, and was obliged to make a march of thirty-five miles before I could reach water. The weather was very hot, and it was night before we reached camp on the Beaver river.

On the 27th I started late, having had some difficulty in crossing the river, making a march of five miles still in a northerly direction, and encamped on another branch of the same river. Company K, of the 2d Nebraska, joined me this day, having been separated from the other company. The next day we had to make some deviations to the west on account of hills and sloughs, and made the outlet of Long lake, a march of about twenty miles.. On the way we saw numerous signs of Indians in large numbers having been recently there, and found an old lame Indian concealed in the bushes, who was well known by many of the men of the command as having for some years resided near Sioux City. He had the reputation of being what is called a "good Indian." He stated that "his horse had been taken away from him, and that he had been left there." He looked almost starved to death. He gave me the following details, which have since mostly turned out to be correct: he stated that "General Sibley had fought the Indians at the head of Long lake, fifty miles northeast from me, some weeks ago; that he followed them down to the mouth of Apple creek; that the Indians attacked him on the way, and that there was some skirmishing. At Apple creek Sibley had another fight, and that in all the fights about 58 Indians were killed; that General Sibley fortified his camp at Apple creek, and after a while returned to James river; that a few days after General Sibley left, the Indians, who had their scouts out watching, recrossed the Missouri, and while doing so discovered a Mackinaw boat on its way down. They attacked the boat, fought the entire day until sundown, sunk her, and killed all on board—twenty-one men, three women, and some children; that before she was sunk, the fire from the boat killed ninety-one Indians and wounded many more; that a small war party followed Sibley some days, returned with the report that he had crossed the James river; then some of the Indians went north; the larger portion, however, went towards the head of Long lake; and that he thought a portion of them were encamped on the Missouri river west of me."

This report was so much in keeping with the Indian mode of warfare, that though it came from an Indian, I was led to give it some consideration, particularly the part that stated the Indians, after watching Sibley's return, recrossed when all danger was over, and went back to their old hunting-grounds. Besides, the guides who were acquainted with the country stated that "a large body of Indians could not live on the other side long without going a great distance west; that always at this season of the year the Indians camped on the Coteau, near the tributaries of the James, where the numerous lakes or springs kept the grass fresh; here the buffalo were plenty, and the lakes and streams full of fish; and that here they prepared their meat for the winter, moving to the Missouri, where the fuel was plenty, to winter." I therefore determined to change my course toward the east, to move rapidly, and go as far as my rations would allow.

I felt serious alarm for the safety of Captain La Boo, who had about fifty men with him, and who had already been out over two days without rations. I encamped here for the next day, and sent out four companies of the 2d Nebraska and one of the 6th Iowa, under command of Major Pearman, 2d Nebraska, to hunt him up, and see if there were any Indians on the Missouri. The next day, however, Captain La Boo's company returned, having made a march of one hundred and eighty-seven miles, living upon what buffalo and game they could kill, scouring the country to my left, overtaking the camp of ten lodges he was sent after, destroying them, but seeing no Indians. This same day (29th) I sent two companies of the 6th Iowa to the mouth of Apple creek. They reported on their return that they found the fortified camp of General Sibley, his trail, and his return trail towards the east; that they could see no signs of there having been any fight there, nor could they see the Mackinaw boat reported by this old Indian. This detachment was under command of Captain Cram, 6th Iowa. The battalion of Major Pearman joined me before starting, having seen nothing, and, after a march of above ninety miles through a country with no wood whatever, but with good grass and plenty of lakes of the most abominable water, on the 3d of September we reached a lake, where, on the plains near by, were the remains of a very large number of buffalo killed, some quite recently. Here I encamped to wait the reports of the commands I had out during the march, who every day discovered fresh signs of Indians, their lodge trails spread over the country, but all moving towards a point known to be a favorite haunt for the Indians. I had this day detailed one battalion of the 6th Iowa, Major House commanding, and Mr. Frank La Framboise as guide, to keep ahead of me five miles, and in case they saw a small band of Indians to attack them, or take them prisoners. If they should find a large band, too large to successfully cope with, to watch the camp at a distance, and send word back to me, my intention being to leave my train under charge of a heavy guard, move up in the night time so as to surround them, and attack them at daybreak. But, for some reason satisfactory to the guide, he bore off much to my left, and came upon the Indians in an encampment of over four hundred lodges, some say six hundred, in ravines, where they felt perfectly secure, being fully persuaded that I was still on my way up the Missouri. This is what the Indian prisoners say. They also state that a war party followed me on my way up, in hopes of stampeding me; but this they could not do. I marched with great care, with an advanced guard and flankers; the train in two lines sixty paces apart, the troops on each side; in front and centre, myself with one company and the battery; all loose stock was kept between the lines of wagons. In this way I lost no animals on the campaign except some few, about a dozen, that got out of camp at night; nor did the Indians, during all the trip, ever attack me or try to stampede me.

Major House, according to my instructions, endeavored to surround and keep in the Indians until word could be sent me; but this was an impossibility with his 300 men, as the encampment was very large, mustering at least 1,200 warriors. This is what the Indians say they had; but I, as well as everybody in the command, say over 1,500. These Indians were partly Santees from Minnesota, Cut-heads from the Coteau, Yanktonais and some Blackfeet who belong on the other side of the Missouri, and, as I have since learned, Upkpa-pas, the same party who fought General Sibley and destroyed the Mackinaw boat; of this I have unmistakable proof from letters and papers found in the camp and on the persons of some of the Indians, besides relics of the late Minnesota massacre; also from the fact that they told Mr. La Framboise, the guide, when he was surrounded by about 200 of them, that "they had fought General Sibley, and they could not see why the whites wanted to come to fight them, unless they were tired of living and wanted to die." Mr. La Framboise succeeded in getting away from them after some difficulty, and ran his horse a distance of more than ten miles to give me information, Major House, with his command, still remaining there. He reached me a little after four o'clock. I immediately turned out my command. The horses at the time were out grazing. At the sound of the bugle the men rushed with a cheer, and in a very few minutes saddled up and were in line. I left four companies and all the men who were poorly mounted in the camp, with orders to strike the tents and corral all the wagons, and starting off with the 2d Nebraska on the right, the 6th Iowa on the left, one company of the 7th Iowa and the battery in the centre, at a full gallop, we made this distance of over ten miles in much less than an hour.

On reaching near the ground I found that the enemy were leaving and carrying off what plunder they could. Many lodges, however, were still standing. I ordered Colonel Furnas, 2d Nebraska, to push his horses to the utmost, so as to reach the camp and assist Major House in keeping the Indians corralled. This order was obeyed with great alacrity, the regiment going over the plains at a full run. I was close upon the rear of the regiment with the 6th Iowa. The Nebraska took to the right of the camp, and was soon lost in a cloud of dust over the hills. I ordered Colonel Wilson, 6th Iowa, to take to the left, while I, with the battery, one company of the 7th Iowa, Captain Millard, and two companies of the 6th Iowa, Major Ten Broeck commanding, charged through the centre of the encampment. I here found an Indian chief by the name of Little Soldier, with some few of his people. This Indian has always had the reputation of being a "good Indian" and friendly. I placed them under guard and moved on. Shortly after I met with the notorious chief Big-head, and some of his men. They were dressed for a fight, but my men cut them off. These Indians, together with some of their warriors, mustering about thirty, together with squaws, children, ponies, and dogs, gave themselves up, numbering human beings over 120. About the same time firing began about a half mile from me ahead, and was kept up, becoming more and more brisk, until it was quite a respectable engagement. A report was brought to me (which proved to be false) that the Indians were driving back some of my command. I immediately took possession of the hillocks near by, forming line and placing the battery in the centre on a higher knoll. At this time night had about set in, but still the engagement was briskly kept up, and in the melee it was hard to distinguish my line from that of the enemy. The Indians made a very desperate resistance, but finally broke and fled, pursued in every direction by bodies of my troops. I would here state that the troops, though mounted, were armed with rifles, and, according to my orders, most of them dismounted and fought afoot until the enemy broke, when they remounted and went in pursuit. It is to be regretted that I could not have had an hour or two more of daylight, for I feel sure, if I had, I could have annihilated the enemy. As it was, I believe I can safely say I gave them one of the most severe punishments that the Indians have ever received. After night set in the engagement was of such a promiscuous nature that it was hard to tell what results would happen; I therefore ordered all the buglers to sound the "rally," and building large fires, remained under arms during the night, collecting together my troops.

The next morning early (the 4th) I established my camp on the battle-field, the wagon train, under charge of Major Pearman, 2d Nebraska, having in the night been ordered to join me, and sent out strong scouting parties in different directions to scour the country to overtake what Indians they could; but in this they were not very successful, though some of them had some little skirmishes. They found the dead and wounded in all directions of them, some miles from the battle-field; also immense quantities of provisions, baggage, &c., where they had apparently cut loose their ponies from "travies" and got off on them; also large numbers of ponies and dogs harnessed to "travies" running all over the prairie. One party that I sent out went near to the James river, and found there 11 dead Indians. The deserted camp of the Indians, together with the country all around, was covered with their plunder. I devoted this day, together with the following, (the 5th,) to destroying all this property, still scouring the country. I do not think I exaggerate in the least when I say that I burned up over four or five hundred thousand pounds of dried buffalo meat as one item, besides three hundred lodges, and a very large quantity of property of great value to the Indians. A very large number of ponies were found dead and wounded on the field; besides, a large number was captured. The prisoners (some 130) I take with me below, and shall report to you more specially in regard to them.

The surgeon of the 2d Nebraska regiment, Dr. Bowen, who has shown great energy and desire to attend to his duties during the campaign, started out during the night of the engagement with a party of 15 men to go back to the old camp to procure ambulances. But as they did not return on the morning of the second day, I knew that he was either lost or captured. (He returned about noon of the second day.) I therefore sent out small scouting parties in every direction to hunt them up. One of these fell into an ambuscade, by which four of the party were killed and the rest driven in. I immediately sent out five companies of the Nebraska regiment, Colonel Furnas in command, who, after a long march, found the Indians had fled. They succeeded, however, in overtaking three concealed in some tall grass, whom they killed. The fight has been so scattered, the dead Indians have been found in so many different places, that it is impossible for me to give an accurate report of the number killed of the enemy. I, however, think I am safe in reporting it at 100. (I report those that were left on the field and that my scouting parties found.)

During the engagement, for some time, the 2d Nebraska, afoot and armed with rifles, (and there are among them probably some of the best shots in the world,) were engaged with the enemy at a distance not over sixty paces, pouring on them a murderous fire in the ravine where the enemy were posted. The slaughter, therefore, must have been immense. My officers and the guides I have with me think 150 will not cover their loss. The Indian reports make it over 200 That the general may know the exact locality of the battle-field I would state that it was, as near as I could judge, about fifteen miles west of James river, and about half way between the latitudes of Bonebute and headwaters of Elm river, as laid down on the government map. The fight took place near a hill called by the Indians White Stone hill.

In conclusion I would state that the troops of my command conducted themselves well; and though it was the first fight that nearly all of them had ever been in, they showed that they are of the right material, and that in time, with discipline, they will make worthy soldiers It is to be regretted we lost so many valuable lives as we did, but this could not be helped; the Indians had formed line of battle with good judgment, from which they could be dislodged only by a charge. I could not use my artillery without greatly endangering the lives of my own men; if I could, I could have slaughtered them.

I send you, accompanying the reports of Colonel Wilson, 6th Iowa, and Colonel Furnas, 2d Nebraska, also official reports of killed and wounded, and take this occasion to thank both those officers for their good conduct and cheerfulness with which they obeyed my orders on the occasion. Both of them had their horses shot in the action. I would also request permission to state that the several members of my staff rendered me every possible assistance.

On the morning of the 6th I took up my line of march for Fort Pierre. If I could have remained in that section of country some two or three weeks I might have accomplished more; but I was satisfied by the reports of my scouts that the Indians had scattered in all directions—some towards the James river; some, probably the Blackfeet, to recross the Missouri; and a part of them went north, where the Indians say they have friends among the half-breeds of the north. My rations were barely sufficient with rapid marches to enable me reach Fort Pierre. The animals, not only the *teams* I have already reported to you as worthless, but also the cavalry horses, showed the effect of rapid marching and being entirely without grain.

I brought with me all the prisoners I had, and tried to question them to gain some information. The men refused to say much, except that they are all "good Indians," and the other bad ones joined their camp without their will.

The squaws, however, corroborate the report I have already given you in regard to the destruction of the people on board the Mackinaw boat and the fights with General Sibley, in which these Indians had a part. They also state that the Indians, after recrossing to this side of the Missouri, sent a party to follow Sibley until he went to the James river, then returned to their camp near Long lake to procure a large quantity of provisions and other articles they had "cached" there, and then came to the camp where I met them.

After marching about one hundred and thirty miles we reached the mouth of the Little Cheyenne on the 11th, where I found the steamboat I had ordered to be there on the 8th instant. It was lucky she was there, for without the grain she brought up I could not have brought my empty wagons back, for some miles north of Cheyenne and to Pierre the grass now is about all gone. I placed my wounded on the boat, and as many empty wagons as she could carry. I am afraid the loss of horses and mules will be considered very great, but it could not be helped. When I found it *impossible* for the rear guard to get an animal along, I had it killed to prevent its falling into the hands of the enemy.

Very respectfully, major, your obedient servant,

ALF. SULLY,
Brigadier General Commanding.

P. S—By actual count the number of my prisoners is 156—men 32, women and children 124. I would also beg leave to say that in the action I had of my command between 600 and 700 men actually engaged. My killed number, as far as ascertained, 20; wounded, 38.

Very respectfully, your obedient servant,

ALF. SULLY,
Brigadier General Commanding.

IN BATTLE-FIELD OF WHITE STONE HILL,
September 3, 1863.

SIR: I have the honor to submit to you an account of the participation of the 6th Iowa cavalry in the battle of White Stone hill on the 3d September, 1863.

As you are aware, the command left the mouth of the Big Cheyenne on the 21st day of August last. Nothing occurred to vary the monotony of the usual hard marches until the date above. On the morning of that day I received an order from you to detail from my command one battalion. It being the turn of the third battalion to scout, an order was issued directing Major A. E. House to report to your headquarters for instructions, which was promptly done. Company M, commanded by Captain V. J. Williams, of said battalion, having their horses used up by constant scouting, was unable to proceed with the detail, its place being supplied by company H of the second battalion. The detail for the scout was company C, L. L. Ainsworth, captain; company I, L. R. Wolffe, captain; company F, S. Shattuck, captain; and company H, of second battalion, C. J. Marsh, captain. In speaking of the third battalion, I always include company H in this battle. They left the command at an early hour. After its departure the brigade took up its line of march to a point ten miles east of this place, where we arrived about two o'clock p. m. In the space of two hours the messenger despatched by Major House rode swiftly into camp with the information that there was a very large body of Indians near him, and that he was in process of negotiation with them until we could arrive. It was but the work of a few minutes for the whole command to be upon its way to the battle-field. The ten miles distance was passed quickly. When we neared the battle-field I received an order from you directing me to take one of my battalions in addition to the third. The first was taken by me, and the second battalion was left with brigade headquarters. I then proceeded to carry out your orders to surround the Indians and drive them in. On every side of the battle-field were straggling Indians endeavoring to escape. Immediately joining the flank of the first upon the second battalion, and marching both in line, we succeeded in driving a large portion of the Indians towards your headquarters, down into a ravine. By the shifting and dressing of the line as it marched I became detached from the first, and was thrown into the third battalion The Indians, after having been quietly driven quite a distance into a common centre, availed themselves of the darkness that was coming, by suddenly firing upon us, which fire, though entirely unexpected, was immediately returned by us with terrible effect. We then commenced making preparations to fight on foot, when the darkness became so impenetrable that it was impossible to proceed further. It was at this fire of the enemy, when riding some little distance in advance of the battalion, that my horse was shot, fatally wounding him with a slug; he lived long enough to carry me about thirty rods. After the darkness set in we went into camp immediately upon the battle-field, corralled our horses, threw out pickets, while the command slept upon its arms. The night was excessively dark and cold, but the picket guard killed two Indians that were found straggling near our camp. At length the day appeared, when we found that the enemy, availing themselves of the darkness, had suddenly decamped, but leaving the country strewed for miles around with their dried meats, provisions, packs, robes, teepees, goods, and ponies.

We lost in this engagement one commissioned officer, ten privates, and had eleven wounded, one of them since dying; some of the rest being wounded badly, and some very slightly.

I take pleasure in bearing testimony to the cheerfulness with which the first battalion, commanded by that veteran Acting Major Galligan, obeyed every order during the time they were under my command.

Company G, of the 1st battalion, and Captain Moreland, Lieutenant Heath, and Sergeant Aubrey, I understand, deserve the highest praise for intrepidity in action. Company K, and Captain Logan and Lieutenant Parker, behaved very bravely, and deserve most favorable notice for their bravery.

Company D, Captain Burdick and lieutenants, although temporarily detached by my orders, are entitled to the highest praise.

The 2d battalion did not participate, immediately, in the fight, as stated; but from the zeal with which they entered on the march to the battle-field, and the cheerfulness with which they obeyed all orders, I have no doubt but the highest desire would have been that of active participants in the battle, under the command of their gallant major.

I wish to call your particular attention to every one of the field and line officers of the regiment, without enumerating them by name. From the highest to the lowest they deserve the most favorable consideration, and the same may be said of almost the entire command engaged. Being their first battle, this was their baptism of fire and steel, and most nobly did they behave. The high valor earned by the noble action of the Iowa troops upon the bloody field of battle has not been tarnished by the gallant Iowa sixth at White Stone hill.

I have spoken more minutely of the action of the third battalion, because it was my destiny to be thrown with them in this battle. I cannot close my report without again calling your attention to the noble part borne by them on this day under their brave Major Hinse. They treated and talked with that large force of Indians until we arrived to their aid, and then the part they bore in the fight deserves the highest praise that can be paid to brave heroic men.

I desire to state that Dr. Carnbum, by his personal presence in my camp on the battle-field, rendered the wounded most invaluable service through that long night. The same meed of praise can also, I understand, be awarded to Assistant Surgeon Haynes, with the first battalion. Assistant Surgeon Burdwill, being left with the sick at camp, was not present at the fight, but rendered such assistance as he was able. The next morning Chaplain D. U. Mitchell was present on the field of battle, and afterwards rendered all the assistance and consolation he could to the wounded, spiritual and bodily.

The commissioned officer mentioned as being lost was Lieutenant T. J. Leavitt, second lieutenant of company B, and acting as regimental adjutant for some time. He had performed the duties of said office with great fidelity and ability. Possessed of great natural ability, with heroic courage and gallant bearing, the entire regiment mourns his loss unceasingly.

Lieutenant George E. Dayton, of company C, and Sergeant Major Charles W. Fogg, deserve favorable notice for bravery during the night of the battle, and also in going out in charge of a detail searching for wounded men upon the battle-field.

Permit me, sir, to congratulate you upon the magnitude of your victory and the great result that will follow from it. By skilful management you completely surrounded hundreds of Indians, whom you signally routed, camping on the battle-field, killing and wounding over one hundred of them, besides destroying immense supplies of provisions and teepees, and taking several hundred prisoners. They have never before received such a terrible blow, and it will certainly be the means of securing a permanent peace with these heretofore troublesome Indians. When we take into consideration the immense obstacles with which your expedition had to contend at every step, and to see them so signally overcome, must astonish every one.

Whilst I thus congratulate you upon your brilliant victory, I must not neglect to pay a passing tribute to the gallant dead of my regiment. They were numbered among the very best men in the command, and most gallantly did they fight and fall. To their bereaved families and relatives I tender my most heartfelt sympathies.

I enclose herewith a couple of letters that were found upon an Indian by some of my regiment. Enclosed in one were two gold dollars and some gold dust. They seem to corroborate the story that the Indians in July last surrounded a Mackinaw boat descending the Missouri river from the gold mine, and after fighting with the crew all day succeeded in killing the entire number.

I have the honor to be, very respectfully, your obedient servant,

D. L. WILSON,
Colonel Sixth Iowa Cavalry.

Captain J. H. Pell,
Assistant Adjutant General.

HEADQUARTERS SIXTH IOWA CAVALRY, BATTLE-FIELD,
September 5, 1863.

CAPTAIN: I have the honor to report the following casualties as occurring in the 6th Iowa cavalry in the battle at this place on the 3d instant.

Killed.—Company C, Private Avery Clark; Company F, Privates William G. Armstrong, Elijah McAllister, and C. M. B. Wagoner; Company H, Sergeant W. W. Davis, and Privates Charles Uckerman and W. K. Dummit; Company K, Privates John Mann and John Herley.

Wounded.—Lieutenant Thomas J. Leavitt, (A. R. A.,) in breast and hip, severe, died September 4; Company C, Private Frederick Sadden, in leg by an arrow, slight; Company F, Sergeant Andrew Baldwin, slight; Sergeant H. A. Post, in arm and back, badly; Private William H. Samson, in thigh and arm, badly; Private Joseph Shaller, left arm shattered, badly; Private Joseph Richards, in foot, badly; John Killilay, in head, badly; Corporal William Fitzgerald, in shoulder, slight; Company G, Sergeant John W. Wright, flesh wound in calf of leg, slight; Corporal Mark Earl, in left foot, severe; J. J. Walter, bugler, across small of back, and by horse falling, slight; Private Charles Stevens, shot through right lung, dangerous; Private George T. Barnhart, in hand and right hip, severe; Company H, Sergeant John Patterson, in back, severe; Sergeant J. M. Van Meter, face and back, by arrow, severe; Company I, Corporal Milo N. Higgins, in side, died September 4, 1863; Private Frederick Albright, in thigh and leg, slight; Company K, Private Elijah F. Biggs, in arm and breast, severe; Private W. Allpaugh, in heel, slight.

Missing.—None.

Very respectfully, your obedient servant,

D. S. WILSON,
Colonel 6th Iowa Cavalry.

Captain J. H. PELL,
Assistant Adjutant General.

HEADQUARTERS SIXTH IOWA CAVALRY, IN CAMP,
September 9, 1863.

CAPTAIN: I have the honor to report the following supplementary statement of the casualties occuring in the 6th regiment Iowa cavalry in the battle of White Stone Hill, on the 3d instant. They were unintentionally omitted in my former report.

Wounded.—Company K, Private Wm. F. Hart, in neck, slight; Private Asa G. White, in thigh.

Private Charles Stephens, company G, 6th Iowa cavalry, mentioned in my former report as dangerously wounded in the right lung, died on the 7th instant.

Very respectfully, your obedient servant,

D. S. WILSON.

Captain J. H. PELL,
Assistant Adjutant General.

HEADQUARTERS SIXTH IOWA CAVALRY, IN CAMP,
September 9, 1863.

CAPTAIN: I have the honor to report the following casualties as occurring in company E, 6th Iowa cavalry, on the 5th instant, under the following circumstances:

I furnished a detail of one commissioned officer, Lieutenant Daniel Ellison, and forty-five non-commissioned officers and privates from company E, 6th Iowa cavalry, for scouting duty, agreeably to Special Orders No. 126, headquarters Indian expedition, bearing date September 4, 1863. Said detail was divided, by your order, before starting on the scout, a part of it being put under command of Lieutenant Hall, 2d Nebraska cavalry, who proceeded in a northerly direction, and when about fifteen miles from camp, came upon and were attacked by a large party of Indians. Four men fell while bravely fighting the enemy. The killed from company E, 6th Iowa cavalry, were: Quartermaster Sergeant James N. Rogers, Private George Kellsa.

Very respectfully, your obedient servant,

D. S. WILSON,
Colonel, Commanding 6th Iowa Cavalry.

Captain J. H. Pell,
Assistant Adjutant General.

Headquarters Second Nebraska Cavalry, Camp No. 38, D. F.,
September 9, 1863.

Sir: I have the honor to report the following casualties in the 2d Nebraska cavalry, in the battle of White Stone Hill, fought September 3, 1863, viz:

Killed.—Company G, Privates John E. Van Order, Charles W. Davenport.

Wounded.—Company E, Private Milton F. Shannon, left leg; Anthony James, private, company F, left thigh; John Cadwalader, private, company F, shoulder; John Welch, private, company F, left shoulder; John Faisted, private, company G, left arm; Ernest Firben, private, company I, left side; Joseph Tucker, private, company K, hip; Eli Sampson, private, company L, thigh; David Ross, private, company L, hip and arm; Jesse Harper, private, company L, abdomen; A. Denham, private, company K, hip; O. B. Hewitt, lieutenant, company M, leg; John W. Culp, private, company M, shoulder.

* * * * * * * *

The following casualties occurred on September 5, 1863, viz:

Killed.—Company K, Sergeant Hugh S. Blair, Private Luke Johnson; Company I, Privates C. B. Backwood, James E. Freeman.

Wounded.—Company G, Jacob Wrigate.

Recapitulation.—Killed, six; wounded, fourteen.

Very respectfully, your obedient servant,

R. W. FURNAS,
Colonel 2d Nebraska Cavalry.

Captain John Pell,
Assistant Adjutant General.

Headquarters Second Nebraska Cavalry, Camp No. 35,
Dakota Territory, September 6, 1863.

Sir: On the 22d of August, 1863, I left the mouth of Little Cheyenne river, Dakota Territory, under command of Brigadier General Sully, in company with the remainder of the troops of the general's expedition, arriving at the foot of Long lake, Dakota Territory, on the 28th of same month, where it was hoped we might encounter the hostile Indians. Scouting parties sent out in various directions returned and reported no Indians to be found; but the trail of General Sibley's command, on Apple creek, was discovered, and an old Indian, captured some days before, reported that General Sibley had been through that country a short time previous, and had had two fights, and that many of the Indians had crossed the Missouri river after the fight, but had recrossed to this side of same recently, and were to be found somewhere in the direction of Elm river, Dakota Territory On the march from this camp additional scouting parties were sent out by the general, but without success; and our rations beginning to run short, the expedition took a circuitous route for Fort Pierre by way of James river. It was with feelings of despondency at what appeared to be the inevitable ill success of the expedition under General Sully, from causes that could not be avoided by any human power, that I realized that it must probably return without accomplishing that for which it was designed.

On Thursday, September 3, 1863, about 4 o'clock p. m., and soon after going into camp, the scouts of the expedition reported six hundred Indian lodges ten miles distant, and in compliance with General Sully's orders I immediately proceeded with the eight companies (namely, E, F, G, H, I, K, L, and M) of the 2d Nebraska cavalry, numbering in all present 350 in rank and file, under my command, from camp No. 33, to assist Major House, commanding the third battalion of the 6th Iowa cavalry, in surrounding the hostile Indians. On approaching the Indian encampment I found House's battalion drawn up in order of battle on the north side, and on reconnoitring the enemy's position perceived that the Indians were leaving as fast as possible. I immediately ordered Major House to pursue on the left flank of the enemy, while I, with the 2d Nebraska, moved on their right flank. Arriving opposite that position I perceived the Indians at a halt, formed in line of battle, apparently awaiting our attack. I immediately formed my men in line of battle. As the enemy was then situated and my men formed, I intended to have advanced the second battalion, (companies F, G, L, and M,) commanded by Captain La Boo, (Major Pearman being field officer of the day, was by order of Brigadier General Sully left in command of the camp; the command therefore devolved upon Captain La Boo, lieutenant captain,) with the 1st battalion, commanded by Major Taffe, (companies E, H, I, and K,) as a reserve, and await further orders from the general commanding. As it was then nearly dark I felt that time was precious, and if anything was to be done that night it must be done speedily, and made up my mind to attack the enemy immediately. I therefore changed my plan of operations. I ordered Major Taffe, with his battalion, to proceed to the head of the ravine in which the Indians were posted, to cut off their retreat in that direction, which order was promptly executed, and his command formed in line awaiting further orders. I then ordered the second battalion to advance directly upon the enemy, which it did. Major Taffe then, by my order, came forward, the line of the two battalions forming an obtuse angle. When within four hundred yards I ordered my men to dismount, and after advancing one hundred yards nearer, ordered the second battalion to open the battle by a volley from their Enfields, which they did with precision and effect, creating quite a confusion in the enemy's ranks. At this time I perceived what I supposed to be House's battalion, about a mile and a half distant, advancing upon the enemy's rear. In the order in which my line was now formed I advanced upon the enemy, pouring in upon him, as I advanced, a fire from my whole line, which was immediately and vigorously returned by the Indians. When within thirty yards of the enemy's lines I ordered a halt in rear of a slight elevation of ground, in front of which was a ravine in which the Indians were posted. The fight now became general, and my whole line was hotly engaged. At this juncture what I supposed to be House's battalion (as it was now quite dark) advanced, and commenced an attack upon the enemy's left. As they were now formed, and fearing that the Indians would attempt to escape by way of a ravine a short distance beyond the left of my line, or get in my rear by the same way, I ordered Major Taffe to extend the left wing of my line in order to cover this supposed outlet for the Indians with my guns. The battle now raged with great fury for some time on both sides. The enemy successively, by a desperate charge, attempted to turn my right and left flanks, but they were repulsed with slaughter. They fell in every direction in front of my line by the unerring aim of my brave soldiers, who, both officers and men, fought with the courage and coolness of veterans, exposed as they were to a galling fire from the enemy during the whole time. At this juncture I became convinced that House's battalion, mistaking my command in the darkness for Indians, were firing into it. I therefore ordered my men to fall back out of range of House's guns and mount their horses, as the Indians were now in a rout and were fleeing out of range of my guns up a ravine some distance to the front. The horses becoming alarmed, and to a considerable extent unmanageable for a short time, created a slight confusion as the men were in the act of mounting, but it was only momentary, as my squadrons were in a few moments again formed in line on the crest of a hill two hundred yards in the rear of my last line of battle, mounted and ready to follow up the victory, as the enemy were fleeing, leaving everything behind them. But it being very dark, and in view of the position of the Iowa 6th, I deemed it imprudent to attempt a pursuit before morning, as it was then half past eight or nine o'clock p. m. Having no means of communicating that night with the general commanding, I ordered my men to dismount and lay on their arms, holding their horses, until early dawn, when I marched from the battle ground of the previous evening, and went into camp about a mile from it and at the upper end of the Indian encampment. On passing over the ground of the recent encampment of the Indians and of the battle, I found that the enemy had abandoned all their tents, clothing, cooking utensils, valuables, supplies, and, in fact, everything they possessed was strewn over the ground of their retreat for miles. Their flight had been so precipitous that they abandoned everything but their dead, whom they carried away as fast as they fell. Their rout was so complete and their flight so sudden that many of their children were left behind on account, as I suppose, of their being an encumbrance to their flight. From the best information derived from guides the enemy's strength was not less than 1,000 warriors. Their loss in killed will not fall short of 150, as scouts sent out next day after the battle report their dead as scattered over the country for miles on the line of their retreat, and their wounded is twice that number. The casualties in the 2d Nebraska cavalry are two killed and thirteen wounded, and ten missing men. There were five horses killed, nine wounded, and nine missing. I found among the effects of the Indians Minié rifles and rifle cartridges; also several boxes of army revolvers and rifle cartridges were found, and various other articles, some of which were undoubtedly taken from the whites in the late Minnesota massacre. The enemy was composed of Santees, Brula, Yanktona, and Blackfeet Sioux, and Cuthead Indians, and were evidently the same Indians with whom General Sibley recently had an engagement on Apple creek. The Indians are now destitute of supplies, clothing, and almost everything else, they having abandoned all except their ponies and arms. Many of the former were, however, killed or captured during the battle. I would have pursued the enemy the following morning after the battle were it not for the exhausted condition of my men and horses.

The officers and men under my command are not only entitled to my thanks, but the confidence of their country, for their bravery, efficiency, and promptness on this occasion. Not a man in any capacity flinched a particle. My special thanks are due to Adjutant Henry M. Akinson, Regimental Quartermaster J. L. McCormick, and Commissary Lieutenant J. Q. Goss, for valuable services rendered me immediately preceding and during the engagement.

All of which is respectfully submitted.

R. W. FURNAS,
Colonel 2d Nebraska Cavalry.

Captain JOHN H. PELL,
A. A. G. Indian Expedition.

SURRENDER OF PORT HUDSON.

The following has been received at headquarters:

HEADQUARTERS DEPARTMENT OF THE GULF, 19TH ARMY CORPS,
Before Port Hudson, July 8, 1863.

GENERAL: I have the honor to report that the garrison of Port Hudson surrendered this afternoon upon the terms stated in the accompanying copy of the articles of capitulation, terms which you will perceive are those of an unconditional surrender. We shall take formal possession at seven o'clock to-morrow morning.

I enclose a copy of the correspondence preliminary to the surrender.

Very respectfully, your most obedient servant,

N. P. BANKS,
Major General, Commanding.

Major General H. W. HALLECK,
Commander-in-Chief, Washington.

Capitulation of Port Hudson.

HEADQUARTERS, PORT HUDSON, LOUISIANA, *July* 7, 1863.

GENERAL: Having received information from your troops that Vicksburg has been surrendered, I make this communication to ask you to give me the official assurance whether this is true or not; and if true, I ask for a cessation of hostilities with a view to the consideration of terms for surrendering this position.

I am, general, very respectfully, your obedient servant,

FRANK GARDNER,
Major General Commanding C. S. Forces.

Major General BANKS,
Commanding U. S. Forces near Port Hudson.

HEADQUARTERS DEPARTMENT OF THE GULF, 19TH ARMY CORPS,
Before Port Hudson, July 8, 1863—10.45 *a. m.*

GENERAL: In reply to your communication, dated the 7th instant, by flag of truce, received a few moments since, I have the honor to inform you that I received yesterday morning, July 7, at 10.45 o'clock, by the gunboat General Price, an official despatch from Major General Ulysses S. Grant, United States army, whereof the following is a true extract:

"HEADQUARTERS DEPARTMENT OF THE TENNESSEE,
"*Near Vicksburg, July* 4, 1863.

"GENERAL: The garrison of Vicksburg surrendered this morning. The number of prisoners, as given by the officers, is 27,000; field artillery, 128 pieces; and a large number of siege guns, probably not less than eighty.

"I am, general, very respectfully, your obedient servant,
"U. S. GRANT, *Major General.*

"Major General N. P. BANKS,
"*Commanding Department of the Gulf.*"

I regret to say that, under present circumstances, I cannot, consistently with my duty, consent to a cessation of hostilities for the purpose you indicate.

Very respectfully, your most obedient servant,
N. P. BANKS,
Major General, Commanding.

Major General FRANK GARDNER,
Commanding C. S. Forces, Port Hudson.

HEADQUARTERS, *Port Hudson, July* 8, 1863.

GENERAL: I have the honor to acknowledge the receipt of your communication of this date, giving a copy of an official communication from Major General U. S. Grant, United States army, announcing the surrender of the garrison of Vicksburg.

Having defended this position as long as I deem my duty requires, I am willing to surrender to you, and will appoint a commission of three officers to meet a similar commission appointed by yourself, at nine o'clock this morning, for the purpose of agreeing upon and drawing up the terms of surrender; and for that purpose I ask for a cessation of hostilities. Will you please designate a point outside my breastworks where the meeting shall be held for this purpose?

I am, general, very respectfully, your obedient servant,
FRANK GARDNER,
Major General, Commanding C. S. Forces.

Major General BANKS,
Commanding U. S. Forces, near Port Hudson.

HEADQUARTERS, U. S. FORCES,
Before Port Hudson, July 8, 1863—4.30 *a. m.*

GENERAL: I have the honor to acknowledge the receipt of your communication of this date, stating that you are willing to surrender the garrison under your command to the forces under my command, and that you will appoint a commission of three officers to meet a similar commission appointed by me, at nine o'clock this morning, for the purpose of agreeing upon and drawing up the terms of the surrender.

In reply, I have the honor to state that I have designated Brigadier General Charles P. Stone, Colonel Henry W. Birge, and Lieutenant Colonel Richard B. Irwin as the officers to meet the commission appointed by you.

They will meet your officers at the hour designated, at a point near where the flag of truce was received this morning. I will direct that active hostilities shall entirely cease on my part until further notice, for the purpose stated.

Very respectfully, your most obedient servant,

N. P. BANKS,
Major General, Commanding.

Major General Frank Gardner,
Commanding C. S. Forces, Port Hudson.

Articles of capitulation proposed between the commissioners on the part of the garrison of Port Hudson and the forces of the United States before said place, July 8, 1863.

Article 1. Major General F. Gardner surrenders to the United States forces under Major General Banks the place of Port Hudson and its dependencies, with its garrison, armament, munitions, public funds, material of war, in the condition, as nearly as may be, in which they were at the hour of cessation of hostilities, namely, six o'clock a. m., July 8, 1863.

Article 2. The surrender stipulated in article 1 is qualified by no condition, save that the officers and enlisted men composing the garrison shall receive the treatment due to prisoners of war, according to the usages of civilized warfare.

Article 3. All private property of officers and enlisted men shall be respected, and left to their respective owners.

Article 4 The position of Port Hudson shall be occupied to-morrow, at seven o'clock a. m., by the forces of the United States, and its garrison received as prisoners of war by such general officer of the United States service as may be designated by Major General Banks, with the ordinary formalities of rendition. The confederate troops will be drawn up in line, officers in their positions, the right of the line resting on the edge of the prairie south of the railroad depot, the left extending in the direction of the village of Port Hudson. The arms and colors will be piled conveniently, and will be received by the officers of the United States.

Article 5. The sick and wounded of the garrison will be cared for by the authorities of the United States, assisted, if desired by either party, by the medical officers of the garrison.

CHARLES P. STONE,
Brigadier General.
W. N. MILES,
Colonel, Commanding Right Wing, Army Port Hudson, La.
WM. DWIGHT,
Brigadier General.
J. G. W. STEEDMAN,
Colonel, Comanding Left Wing.
HENRY W. BIRGE,
Colonel, Commanding 3d Brigade, Grover's Division.
MARSHALL J. SMITH,
Lieutenant Colonel and Chief H. A.

Approved:

FRANK GARDNER, *Major General.*

Approved:

N. P. BANKS, *Major General, Commanding.*

HEADQUARTERS DEPARTMENT OF THE GULF,
19th Army Corps, Port Hudson, July 10, 1863.

SIR: I have the honor to inform you that with the post there fell into our hands 5,500 prisoners, including one major general and one brigadier general; 20 pieces of artillery, five complete batteries, numbering 31 pieces of field artillery; a good supply of projectiles for light and heavy guns; 44,000 pounds of cannon powder, 5,000 stand of arms, and 150,000 rounds of small-arm ammunition, besides a small amount of stores of various kinds. We captured also two steamers, one of which is very valuable. They will be of great service at this time.

N. P. BANKS,
Major General, Commanding.

Major General H. W. HALLECK, *General-in-Chief.*

HEADQUARTERS DEPARTMENT OF THE TENNESSEE, 19TH ARMY CORPS,
Near Vicksburg, July 4, 1863.

GENERAL: The garrison of Vicksburg surrendered this morning. Number of prisoners as given by the officers is 27,000. Field artillery, 128 pieces; and a large number of siege guns, probably not less than eighty. The other stores will probably not amount to any great deal.

I held all my surplus troops out on Black river, and between there and Haines's Bluff. Intending to assault in a few days, I directed that they be kept in readiness to move on the shortest notice to attack Johnson.

The moment the surrender of Vicksburg was agreed upon, the order was given, and troops are now in motion. General Sherman goes in command of this expedition. His force is so heavy I think it cannot fail.

This move will have the effect of keeping Johnson from detaching a portion of his force for the relief of Port Hudson.

Although I had the garrison of Vicksburg completely in my power, I gave them the privilege of being paroled at this place, the officers to retain their side arms and private baggage, and field, staff, and cavalry officers to take with them one horse each. I regard the terms really more favorable than an unconditional surrender. It leaves the transports and troops free for immediate use. At the present juncture of affairs in the east, and on the river above here, this may prove of vast importance.

I hope, general, and from what Admiral Porter tells me, this probably will find you in possession of Port Hudson.

I am, general, very respectfully, your obedient servant,

U. S. GRANT, *Major General.*

Major General N. P. BANKS,
Commanding Department of the Gulf.

Official copy:

RICH'D B. IRWIN, *A. A. General*

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